BAD BOY BUGGIES

OWNER'S MANUAL

AMBUSH iS

634508

ISSUED AUGUST 2013

WELCOME

Thank you for purchasing this vehicle. Before driving the vehicle, we ask you to spend some time reading this Owner's Guide. This guide contains the information that will assist you in maintaining this highly reliable vehicle. Some illustrations may show items that are optional for your vehicle. This guide covers the operation of several vehicles; therefore, some illustrations may not represent your vehicle. Physical differences in controls will be illustrated.

Most of the service procedures in this guide can be accomplished using common, automotive hand tools. Contact your service representative on servicing the vehicle in accordance with the Periodic Service Schedule.

Repair or replacement parts are available through your BAD BOY BUGGIES retailer.

The following information is needed when contacting us concerning service or parts for your vehicle:

Vehicle Model _____

VIN or Serial Number _____

FOREWORD

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

OWNER'S GUIDE

4 X 4 HYBRID UTILITY VEHICLE

AMBUSH iS

STARTING MODEL YEAR 2014

Never modify the vehicle in any way that will alter the weight distribution of the vehicle, decrease its stability or increase the speed beyond the factory specifications. Such modifications can cause serious personal injury or death. Bad Boy Buggies prohibits and disclaims responsibility for any such modifications or any other alteration which would adversely affect the safety of the vehicle.

BB Buggies Inc. reserves the right to incorporate engineering and design changes to products in this manual, without obligation to include these changes on units sold previously.

The information contained in this manual may be revised periodically by BB Buggies Inc., and therefore is subject to change without notice.

BB Buggies Inc. DISCLAIMS LIABILITY FOR ERRORS IN THIS MANUAL, and SPECIFICALLY DISCLAIMS LIABILITY FOR INCIDENTAL AND CONSEQUENTIAL DAMAGES resulting from the use of the information and materials in this Manual.

TO CONTACT US
Bad Boy Buggies
1451 Marvin Griffin Rd.
Augusta, GA. 30906

FAX: 855-256-9900
E-mail: info@badboybuggies.com
For parts and repair contact your local dealer. To locate a local dealer please go online to our web site:
www.BADBOYBUGGIES.com

FOREWORD

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

This vehicle has been designed and manufactured in the United States of America (USA) as a 'World Vehicle'. The Standards and Specifications listed in the following text originate in the USA unless otherwise indicated.

The use of non Original Equipment Manufacturer (OEM) approved parts may void the warranty.

Overfilling battery may void the warranty.

Tampering with or adjusting the governor to permit vehicle to operate at above factory specifications will void the vehicle warranty.

When servicing engines, all adjustments and replacement components must be per original vehicle specifications in order to maintain the United States of America Federal and State emission certification applicable at the time of manufacture.

BATTERY PROLONGED STORAGE

All batteries will self discharge over time. The rate of self discharge varies depending on the ambient temperature and the age and condition of the batteries.

A fully charged battery will not freeze in winter temperatures unless the temperature falls below -75° F (-60° C).

For winter storage, the batteries must be clean, fully charged and disconnected from any source of electrical drain. The battery charger and the controller are both sources of electrical drain. Unplug the battery charger DC plug from the vehicle receptacle.

As with all electric vehicles, the batteries must be checked and recharged as required or at a minimum of 30 day intervals.

BATTERY DISPOSAL

Lead-acid batteries are recyclable. Return whole scrap batteries to distributor, manufacturer or lead smelter for recycling. For neutralized spills, place residue in acid-resistant containers with absorbent material, sand or earth and dispose of in accordance with local, state and federal regulations for acid and lead compounds. Contact local and/or state environmental officials regarding disposal information.

WARRANTY

Separate inserts supplied in packaging with the vehicle provide information on Product Warranty and on Emissions Warranty. Failure to follow instructions for emission parts replacement may violate Federal Law (40 CFR part 1068.105 (b)) and be subject to fines and other penalties as described in the Clean Air Act.

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Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

Notes:

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This manual has been designed to assist in maintaining the vehicle in accordance with procedures developed by the manufacturer. Adherence to these procedures and troubleshooting tips will ensure the best possible service from the product. To reduce the chance of personal injury or property damage, the following must be carefully observed:

⚠ CAUTION

Certain replacement parts can be used independently and/or in combination with other accessories to modify an E-Z-GO-manufactured vehicle to permit the vehicle to operate at or in excess of 20mph. When an E-Z-GO-manufactured vehicle is modified in any way by the Distributor, Dealer or customer to operate at or in excess of 20mph, UNDER FEDERAL LAW the modified product will be a Low Speed Vehicle (LSV) subject to the strictures and requirements of Federal Motor Vehicle Safety Standard 571.500. In these instances, pursuant to Federal law the Distributor or Dealer MUST equip the product with headlights, rear lights, turn signals, seat belts, top, horn and all other modifications for LSV's mandated in FMVSS 571.500, and affix a Vehicle Identification Number to the product in accordance with the requirements of FMVSS 571.565. Pursuant to FMVSS 571.500, and in accordance with the State laws applicable in the places of sale and use of the product, the Distributor, Dealer or customer modifying the vehicle also will be the Final Vehicle Manufacturer for the LSV, and required to title or register the vehicle as mandated by State law.

E-Z-GO will NOT approve Distributor, Dealer or customer modifications converting E-Z-GO products into LSV's.

The Company, in addition, recommends that all E-Z-GO products sold as personal transportation vehicles BE OPERATED ONLY BY PERSONS WITH VALID DRIVERS LICENSES, AND IN ACCORDANCE WITH APPLICABLE STATE REQUIREMENTS. This restriction is important to the SAFE USE AND OPERATION of the product. On behalf of E-Z-GO, I am directing that E-Z-GO Branch personnel, Distributors and Dealers advise all customers to adhere to this SAFETY RESTRICTION, in connection with the use of all products, new and used, the Distributor or Dealer has reason to believe may be operated in personal transportation applications.

Information on FMVSS 571.500 can be obtained at Title 49 of the Code of Federal Regulations, section 571.500, or through the Internet at the website for the U.S. Department of Transportation - at Dockets and Regulation, then to Title 49 of the Code of Federal Regulations (Transportation).

GENERAL

All vehicles can be used for a variety of tasks beyond the original intended use of the vehicle; therefore, it is impossible to anticipate and warn against every possible combination of circumstances that may occur. No warning can take the place of good common sense and prudent driving practices.

Good common sense and prudent driving practices do more to prevent accidents and injury than all of the warnings and instructions combined. E-Z-GO strongly suggests that all users and maintenance personnel read this entire manual paying particular attention to the CAUTIONS, WARNINGS and DANGERS contained therein.

If you have any questions regarding this vehicle, contact your E-Z-GO Dealer or write to the address on the back cover of this publication, Attention: Customer Care Department.

E-Z-GO reserves the right to make design changes without obligation to make these changes on units previously sold and the information contained in this manual is subject to change without notice.

E-Z-GO IS NOT LIABLE FOR ERRORS IN THIS MANUAL. E-Z-GO IS NOT LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES THAT RESULT FROM THE USE OF THE MATERIAL IN THIS MANUAL.

This vehicle conforms to the current applicable standard(s) for safety and performance requirements.

These vehicles are designed and manufactured for off-road use. They DO NOT conform to Federal Motor Vehicle Safety Standards of the United States of America (USA) and are not equipped for operation on public streets. Some communities may permit these vehicles to be operated on their streets on a limited basis and in accordance with local ordinances.

With electric powered vehicles, be sure that all electrical accessories are grounded directly to the battery (-) post. **Never use the chassis or body as a ground connection EXCEPT for grounding the gas engine starting battery.**

Refer to GENERAL SPECIFICATIONS for vehicle seating capacity.

SAFETY

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

Never modify the vehicle in any way that will alter the weight distribution of the vehicle, decrease its stability or increase the speed or extend the stopping distance beyond the factory specification. Such modifications can result in serious personal injury or death.

Do not make modifications or changes, E-Z-GO prohibits and disclaims responsibility for any such modifications or any alterations which would adversely affect the safety of the vehicle.

Vehicles that are capable of higher speeds must limit their speed to no more than the speed of other vehicles when used in a golf course environment. Additionally, speed should be further moderated by the environmental conditions, terrain and common sense.

Operation of the vehicle is limited to persons above the height of 59 inches (150 cm).

GENERAL OPERATION

ALWAYS:

- Use the vehicle in a responsible manner and maintain the vehicle in safe operating condition.
- Read and observe all warnings and operation instruction labels affixed to the vehicle.
- Follow all safety rules established in the area where the vehicle is being operated.
- Leave the vehicle and seek shelter when there is a risk of lightning.
- Reduce speed to compensate for poor terrain or conditions.
- Apply service brake to control speed on steep grades.
- Maintain adequate distance between vehicles.
- Reduce speed in wet areas.
- Use extreme caution when approaching sharp or blind turns.
- Use extreme caution when driving over loose terrain.
- Use extreme caution in areas where pedestrians are present.

MAINTENANCE

ALWAYS:

- Maintain the vehicle in accordance with the manufacturer’s periodic service schedule.
- Ensure that repairs are performed by those that are trained and qualified to do so.
- Follow the manufacturer’s maintenance procedures for the vehicle. Be sure to disable the vehicle before performing any maintenance. Disabling includes removing the key from the key switch and removal of a battery wire.
- Insulate any tools used within the battery area in order to prevent sparks or battery explosion caused by shorting the battery terminals or associated wiring. Remove the battery or cover exposed terminals with an insulating material.
- Check the polarity of each battery terminal and be sure to rewire the batteries correctly.
- Use specified replacement parts. Never use replacement parts of lesser quality.
- Use recommended tools.
- Determine that tools and procedures not specifically recommended by the manufacturer will not compromise the safety of personnel nor jeopardize the safe operation of the vehicle.
- Support the vehicle using wheel chocks and jack stands. Never get under a vehicle that is supported by a jack. Lift the vehicle in accordance with the manufacturer’s instructions.
- Maintain the vehicle in an area away from exposed flame or persons who are smoking.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

- Be aware that a vehicle that is not performing as designed is a potential hazard and must not be operated.
- Test drive the vehicle after any repairs or maintenance. All tests must be conducted in a safe area that is free of both vehicular and pedestrian traffic.
- Replace damaged or missing warning, caution or information labels.
- Keep complete records of the maintenance history of the vehicle.

The manufacturer cannot anticipate all situations, therefore people attempting to maintain or repair the vehicle must have the skill and experience to recognize and protect themselves from potential situations that could result in severe personal injury or death and damage to the vehicle. Use extreme caution and, if unsure as to the potential for injury, refer the repair or maintenance to a qualified mechanic.

VENTILATION

Hydrogen gas is generated in the charging cycle of batteries and is explosive in concentrations as low as 4%. Because hydrogen gas is lighter than air, it will collect in the ceiling of buildings necessitating proper ventilation. Five air exchanges per hour is considered the minimum requirement.

NEVER charge a vehicle in an area that is subject to flame or spark. Pay particular attention to natural gas or propane gas water heaters and furnaces.

Chargers must be installed and operated in accordance with charger manufacturers recommendations or applicable electrical code (whichever is higher).

ALWAYS:

- Store gasoline vehicles in a well ventilated area to prevent gasoline fumes from accumulating.
- Fuel vehicle in an area free from flame or spark, pay particular attention to natural gas or propane water heaters and furnaces.
- Work on or operate the vehicle in a well ventilated area to prevent the accumulation of exhaust gases such as carbon monoxide.
- Use a dedicated circuit for each battery charger. Do not permit other appliances to be plugged into the receptacle when the charger is in operation.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

LABELS AND PICTOGRAMS

WARNING
Failure to follow these instructions could result in DEATH or SERIOUS INJURY
READ THE MANUAL
627498
NO PASSENGERS IN TRUCK BED
WARNING READ THE MANUAL
SECURE LOAD MAX BED WEIGHT 500 lbs or 255 kg
MAX TAILGATE WEIGHT 100 lbs OR 45kg
HIGH CENTER OF GRAVITY MAY CAUSE TIP OVER
74821G01
MAX SIDE SLOPE 14°
DO NOT PLACE BATTERIES IN TRASH THEY CONTAIN LEAD
35493G01
MAY CAUSE EXPLOSION DO NOT FILL FUEL CONTAINERS IN TRUCK BED
MAX HEIGHT FOR CENTER OF GRAVITY 5” OR 12 cm ABOVE FLOOR
75696G01
WARNING HOT SURFACE
74099G01
DO NOT RELEASE BED LATCH WITH ANYONE STANDING BEHIND BED (Dump Bed Equipped Vehicles Only)

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

FRONT DIFFERENTIAL LOCK

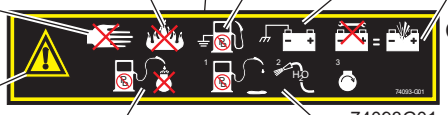
REAR DIFFERENTIAL LOCK

633615

LOCKED

WARNING READ THE MANUAL

UNLOCKED



NO TAMPERING KEEP HANDS OUT

DO NOT EXPOSE TO FLAME

UNLEADED GASOLINE

NEGATIVE GROUND BATTERY (GAS STARTING)

SHORTING BATTERY TERMINALS MAY CAUSE EXPLOSION

WARNING

DO NOT SPILL FUEL ON HOT ENGINE

CLEAN UP FUEL SPILLS WITH WATER BEFORE STARTING ENGINE

74093G01

633615

⚠WARNING **Failure to follow these instructions could result in DEATH or SERIOUS INJURY**

- Maximum deck load is 250 lbs. (110 kg)
- The center of gravity of the load must not exceed 12 inches (30 cm) above the deck floor.
- The load must be as far forward as possible and secured.
- Top heavy loads may cause vehicle instability or tip over.
- Drive slowly straight up or down slopes and in turns.
- NEVER allow passengers to ride on load deck.

628942

628942

⚠WARNING **Failure to follow these instructions could result in DEATH or SERIOUS INJURY**

- ALWAYS remain PROPERLY SEATED with SEAT BELT FASTENED and HOLDING ON.
- ONLY 2 occupants on bench seat.
- Children may need assistance to remain PROPERLY SEATED with SEAT BELT FASTENED and HOLDING ON. NEVER leave children unattended.
- KEEP feet, legs, hands and arms inside the vehicle at all times.
- NEVER attempt to enter or exit a moving vehicle.
- AVOID standing in front of or behind vehicle.

628943

628943

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

Notes:

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VEHICLE SPECIFICATIONS

MODEL: BAD BOY BUGGIES - AMBUSH iS
TYPE: GAS / ELECTRIC PARALLEL DRIVE VEHICLE
MODEL YEAR: 2014
Part No:. 631492

PRODUCT SPECIFICATION

CONFIGURATION HIGHLIGHTS

Engine: Subaru EH72 Fuel Injection 28 hp (20.8 kW) Rated, 43.9 ci (720 cc)

- **Valve Train:** Overhead valve
- **Lubrication:** Pressurized oil system, spin-on oil filter
- **Balancer:** Internal counter rotating balance shaft
- **Fuel System:** Fuel injection with electromagnetic fuel pump
- **Ignition:** Electronic spark/magneto
- **Air Cleaner:** Replaceable dry cartridge w/pre-filter

Electrical: Starter/Generator, solid-state regulator, 12 Volt maintenance free battery (525 CCA, 60 minute reserve)
Drive Train Gas: Automatic, continuously variable transmission (CVT). Manual locking differentials (front and rear)
Drive Train Elec: 48V (6x8V) AC with speed sensor
Brakes: 4-wheel hydraulic disc brakes. Hand operated park brake (floor mounted).
Transaxle: Differential with helical gears, ground speed governor, forward/reverse
Seating: Bench Seat
Cargo Bed: Roto-molded cross-linked polyethelene. Lifts for access to powertrain.

PRODUCT OVERVIEW

Dimensions	
Overall Length	115.5 in (293.4 cm)
Overall Width	54.5 in (138.4 cm)
Overall Height	51 in (130 cm) top of steering wheel
	76 in (193 cm) from canopy
Wheel Base	81.5 in (207 cm)
Front Wheel Track	43.38 in (110 cm)
Rear Wheel Track	44.38 in (113 cm)
Gnd Clearance @ Differential	7 in (17.8 cm) front skid plate
Cargo Box Width (inside)	44.0 in (112 cm)
Cargo Box Length (inside)	36.0 in (91 cm)
Cargo Box Depth (inside)	10.5 in (27 cm)
Cargo Box Capacity	9.6 cu ft (0.27 m3)
Cargo Box Material	Roto-molded polyethylene
Vehicle Power	
Power Source	GAS: 4 cycle, 43.9 ci (720 cc)
	Elec: 48V AC Motor
Valve Train	V Twin Cylinder OHV
Horsepower (kW)	GAS 28 hp (20.8 kW) rated
	Elec 17.2 hp (12.8 kW) Peak
Electrical System	Starter/Generator, solid-state regulator
Battery (Qty, Type)	One 12 Volt maintenance free for starter/gen
	6x8 V for Elec Drive
Key or Pedal Start	Key Start
Air Cleaner	Dry cartridge w/ pre-filter
Lubrication	Pressurized oil system
Oil Filter	Spin-on oil filter
Cooling System	Air cooled
Fuel Capacity	5.3 gallon (20 L) tank
Differential	Helical gears with manual front and rear lock-up

Vehicle Power Cont.	
Gear Selection	Forward-Reverse
Front Axle Ratio	14.87:1
Rear Axle Ratio	14.38:1 Fwd; 14.36 Rev
Performance	
Seating Capacity	2 Persons
Curb Weight	1791 lb (812 kg)
Bed Load Capacity	500 lb (225 kg)
Vehicle load capacity	900 lb (408 kg)
Outside Clearance Circle	33.2 ft (10.1 m)
Speed (Level Ground)	2WD Elec: 25 mph ± 1 mph (40.1 kph ± 1.6 kph)
	4WD : 25 mph ± 1 mph (40.1 kph ± 1.6 kph)
Towing Capacity (4WD)	1200 lb (545 kg)
Steering & Suspension	
Steering	Self-compensating rack and pinion
Front Suspension	Independent Mc Pherson Strut
Rear Suspension	Independent Mc Pherson Strut
Service Brake	4 wheel hydraulic disc brakes
Parking Brake	Hand Operated
Front Tires	MudLite 25x10-12 Uni-Directional
Rear Tires	MudLite 25x10-12 Uni-Directional
Body & Chassis	
Frame	Welded steel with DuraShield™ powder coat
Front Body & Finish	Injection Molded TPO
Rear Body & Finish	Steel. Base coat/clear coat
Standard Color	Matte Black

Some items shown may be optional equipment

OPTIONS & FIELD INSTALLED ACCESSORIES (Installation not included)*

Item	Std	Opt	Fld
TIRES & WHEELS:			
MudLite Black Steel 25x10-12	●		
MudLite Black Alu 25x10-12		●	
MudLite Brushed Alu 25x10-12		●	
Journey Black Alu 25x10-12		●	
Journey Black Steel 25x10-12		●	
Journey Brushed Alu 25x10-12		●	
COLORS:			
Body Color - Matte Black	●		
Body Color - Matte Green		●	
Body Color - Flame Red		●	
Body Color - Real Tree XTRA		●	
Body Color - Real Tree Max 4		●	
Bench Seats:			
Seat Color - Black	●		
HAULING & TOWING:			
2 in (5 cm) Receiver	●		
OTHER PERFORMANCE:			
Convertible Rear Seat		●	
Occupant Protective System	●		
ELECTRICAL:			
12 Volt Power Outlet	●		
Tail Lights	●		
Fuel Gauge	●		
Halogen Headlights	●		
SOC Meter	●		
Low Oil Indicator	●		
LED Headlights		●	
WEATHER PROTECTION:			
Top Canopy (hard)			●
Windshield Flat			●
Windshield Fold Down			●

Aftermarket Category

See Parts & Accessories Brochure for Additional Ambush Accessories

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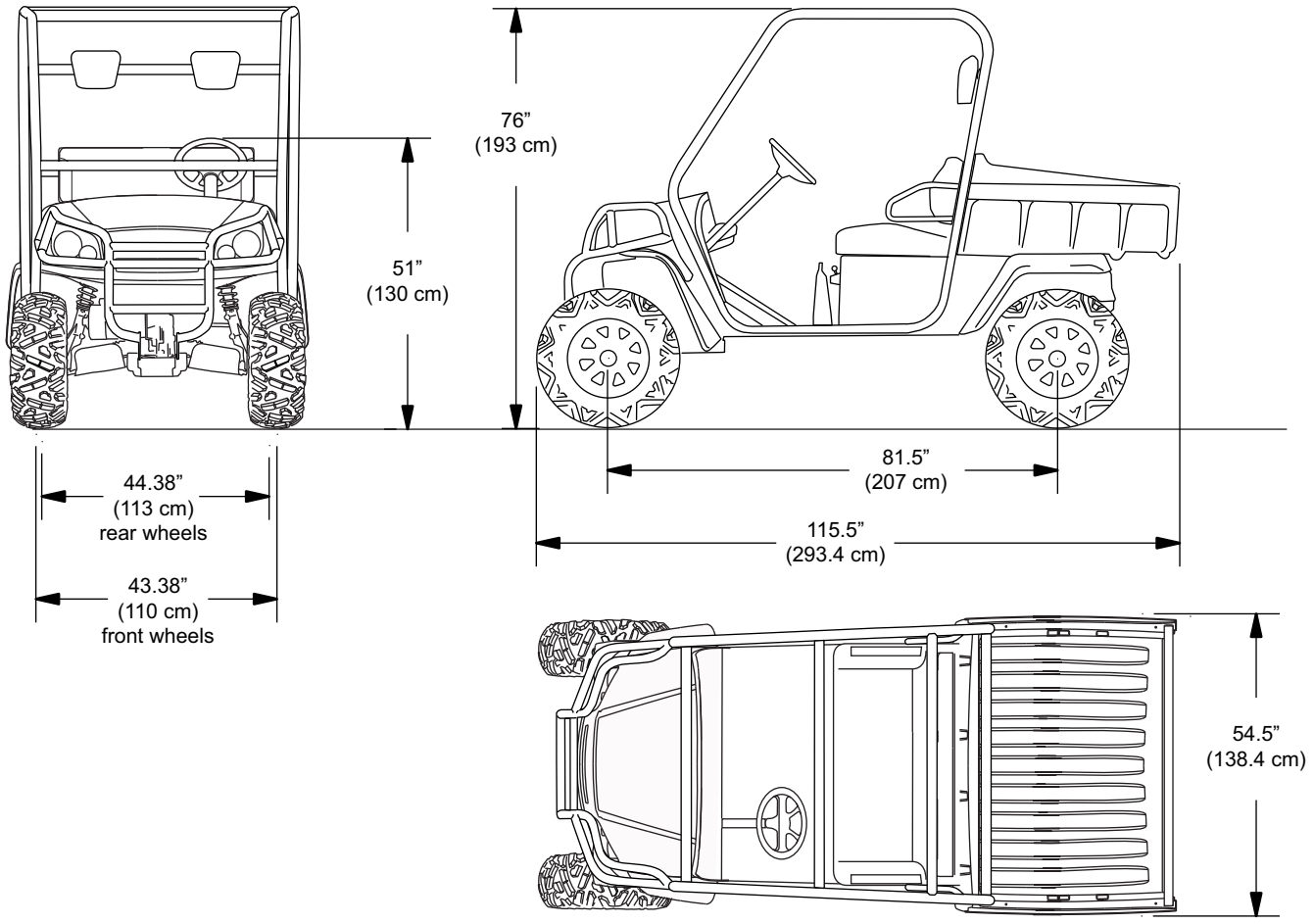
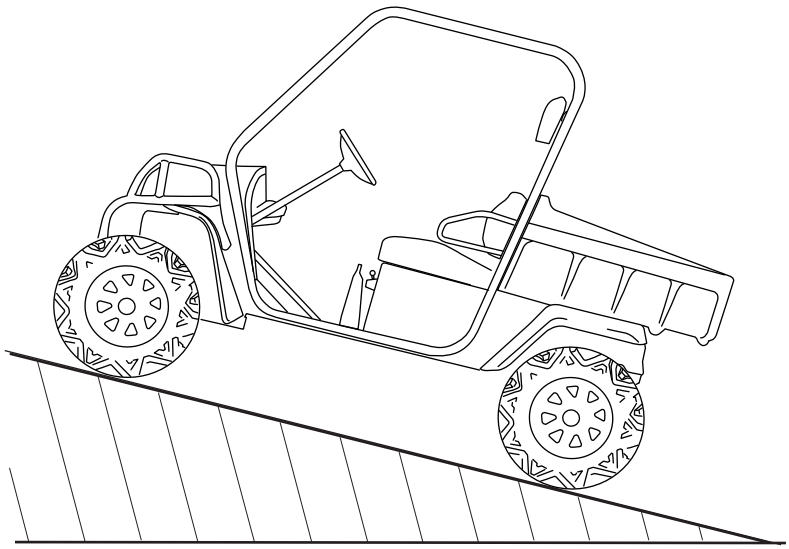
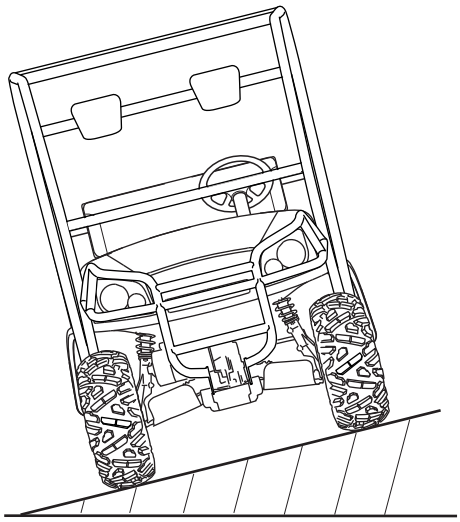
VEHICLE DIMENSIONS





Maximum Recommended Ramp Grade
25% or 14° Max.



Maximum Recommended Side Tilt
25% or 14° Max.

GENERAL SPECIFICATIONS

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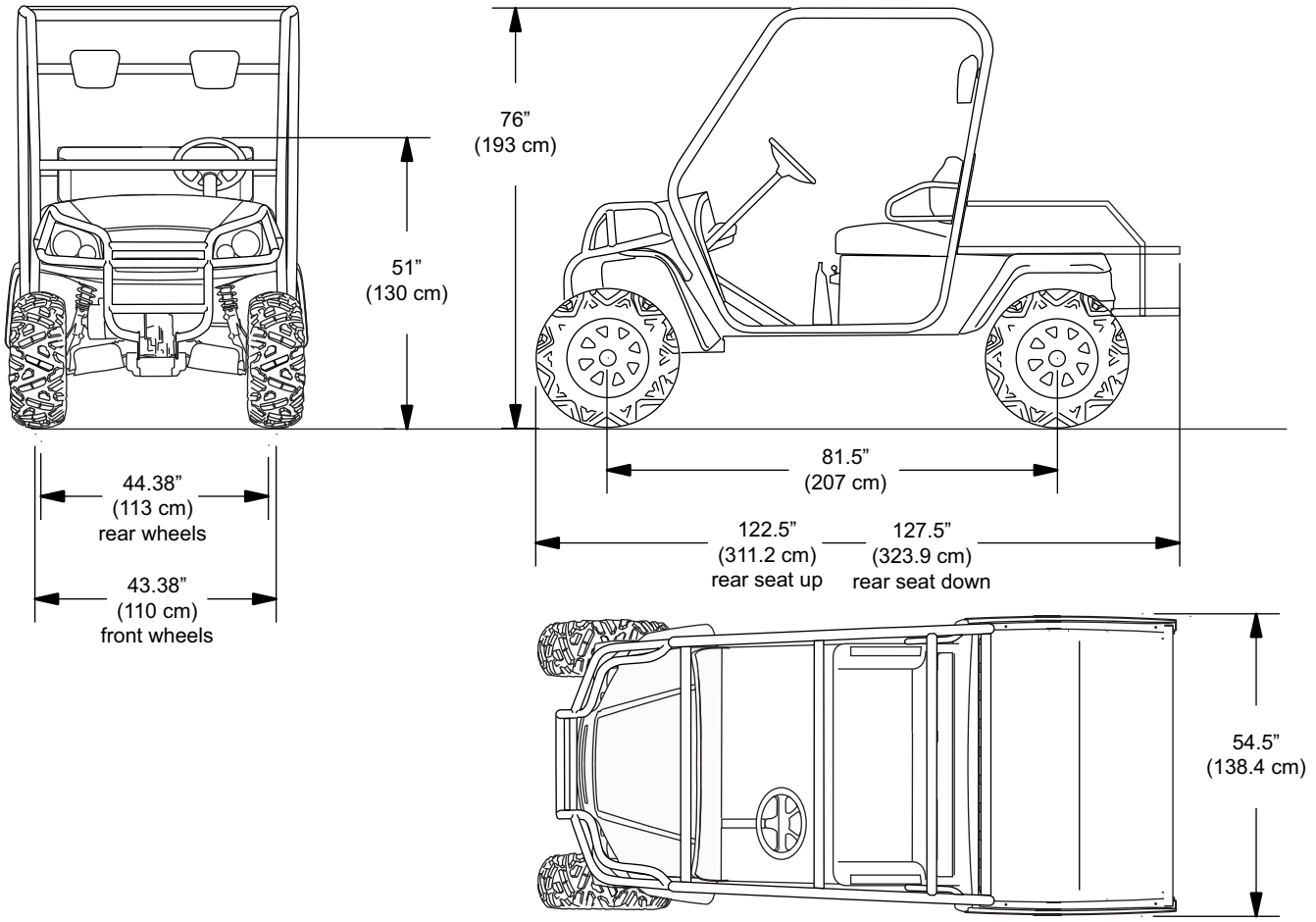

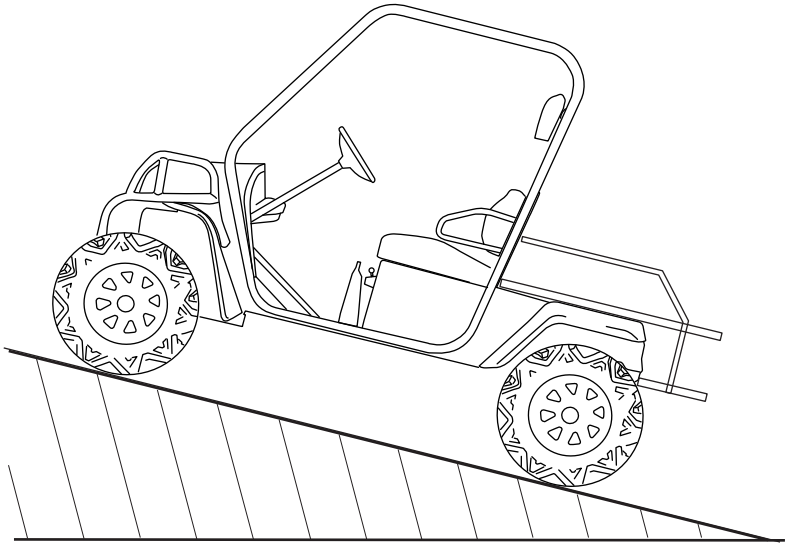

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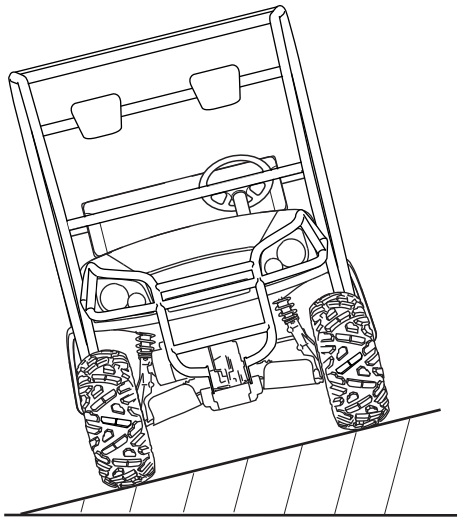

Maximum Recommended Side Tilt
25% or 14° Max.

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OPERATOR CONTROLS AND FEATURES

1. Key Switch / Direction Selector

Located on the dash panel, this switch permits the selection of either ‘F’ (forward), ‘R’ (reverse) or N (neutral). Vehicle should be left with the key set to OFF, removed from the switch and the parking brake engaged when unattended.

2. Mode Switch

Located on the left side of the dash panel, this switch permits the selection of either gas powered rear wheel drive, electric powered front wheel drive or four wheel drive utilizing both electric and gas powertrains at the same time.

3. State of Charge Meter

Located in the dash panel to the right of the mode switch, above the fuel gauge, this gauge indicates the amount of usable power in the batteries, with ‘F’ indicating a full charge on the battery pack and ‘E’ indicating the battery pack need to be charged.

4. Fuel Gauge with Low Oil Pressure Indicator

Located in the dash panel below the state of charge meter. The fuel gauge indicates the amount of gasoline in the fuel tank, with ‘F’ indicating a full tank and ‘E’ indicating an empty fuel tank. The fuel gauge is equipped with a low oil pressure indicator. A low engine oil pressure condition is alerted with a yellow indicator light.

5. Gas Engine Start Switch

Located on the dash panel to the right of the fuel gauge, this switch starts the gasoline engine when pressed with the key switch turned to ON.

6. Regen Mode Switch

Located on the dash panel to the right of the state of charge meter and the fuel gauge. The operator can switch from High and low regen mode to suit terrain/range conditions.

7. Light Switch

Located on the dash panel to the right of the regen mode switch. In the ON position the headlights and all dash panel lights will be on, the OFF position will turn off power to all lights.

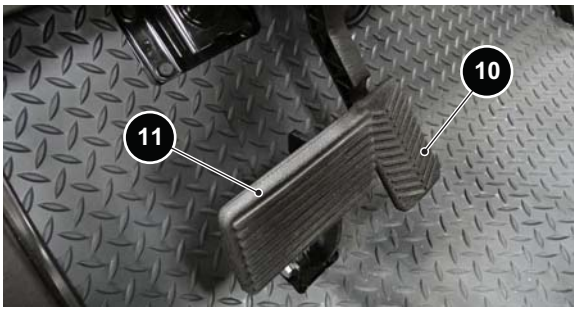
8. Accessory Switch Location

Rectangular hole plugs may be removed to accommodate switches for accessory items.

9. Winch Switch (if equipped)

Located in the driver side glove box.

10. Accelerator Pedal



With the key switch set to ‘R’, ‘ON’ or ‘F’, depressing the accelerator pedal starts the electric motor depending upon the position of the MODE switch. When the pedal is released, the motor. To stop the vehicle more quickly, depress the brake pedal.

11. Brake Pedal

Depress the brake pedal to slow and stop the vehicle. This vehicle is equipped with four wheel hydraulic disc brakes.

12. Park Brake

The hand operated park brake is located on the floorboard. The brake is engaged when the handle is pointed upward and disengaged when the handle is parallel floorboard. When leaving the vehicle unattended, engage the park brake by raising the handle until it is locked in place. To release the park brake raise the handle slightly and press the button on the end of the handle and push the handle down towards the floor.

13. Differential Locks

Located in the seat wrap panel below the driver seat. The front and rear drive axles are equipped with manually operated locking differentials. With the lever(s) in the forward position the selected differential is locked and power is distributed to both of the axle drive wheels; with the lever(s) in the rear position the differential is unlocked and power will be transferred to the wheel that is loosing traction, once the wheel regains traction the power will be transferred to both wheels.1. State of Charge Meter

Located in the dash panel to the right of the mode switch, above the gas fuel gauge. The state of charge meter indicates the amount of usable power in the batteries, with ‘F’ indicating a full charge on the battery pack and ‘E’ indicating the battery pack needs to be charged.

14. 12 Volt Power Outlet

Located in the passenger side glove box. The 12 volt outlet will supply a constant power supply for accessories equipped with a 12 volt plug.

15. Battery Fill Tube

The battery fill tube for the batteries located under the front cowl is standard on the Ambush iS. The fill tube allows water to be added to the front batteries without removing the access panel in the cowl.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

16. Charger Receptacle

The polarized charger receptacle for the electric battery pack is located in the seat wrap panel below the center console. Always check to be sure the receptacle is free from dirt and debris before connecting the charger cord.

17. Winch Remote Receptacle (if equipped)

Located in the driver side glove box. Winch accessory available for this vehicle may have a remote operation option.

18. Truck Bed Latch

Located at the front of the manual lift truck bed. To release the latching mechanism pull the handle upward then raise the front of the truck bed.

19. Truck Bed

The tilting molded plastic bed is equipped with a tailgate.

20. Taillights

The taillights are located in the rear below the truck bed, they are controlled by the light switch on the dash panel.

21. Rear Seat / Load Deck (if equipped)

The rear facing seat is designed for two occupants. The load deck is created by unfolding the rear facing seat.

22. Side Net

Side nets are a standard safety feature provided with the vehicle and must be properly secured before operating vehicle.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

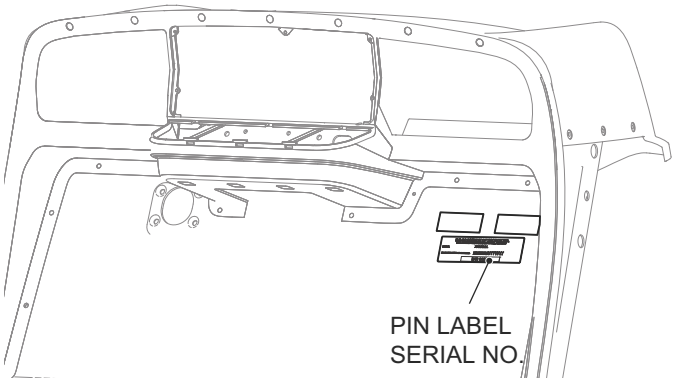
Notes:

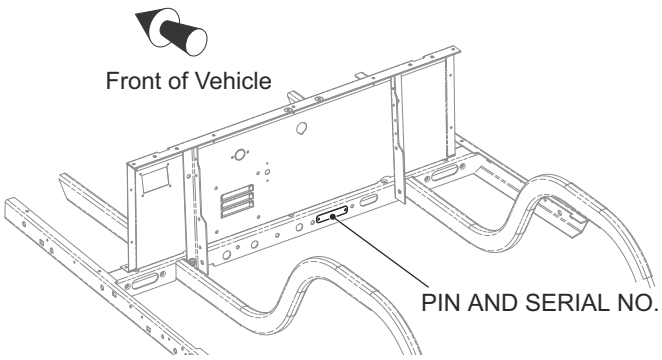
Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

PIN AND SERIAL NUMBER LOCATION

Two serial number and manufacture date code plates are on the vehicle. One is placed under the floor mat on the passenger side of the vehicle, the other is located on the frame below the seat wrap.

Design changes take place on an ongoing basis. In order to obtain correct components for the vehicle, the PIN number, manufacture date code, serial number, vehicle model manufacture date code, must be provided when ordering service parts.





⚠ WARNING

Improper use of this vehicle could result in severe injury or death. The AMBUSH is a light duty utility vehicle, NOT an All Terrain Vehicle (ATV).

To reduce the possibility of severe injury or death resulting from loss of vehicle control the following warnings must be observed:

When driving vehicle, consider the terrain, traffic conditions and the environmental factors which affect the terrain and the ability to control the vehicle.

Use extra care and reduced speed when driving on poor surfaces, such as loose dirt, wet grass, gravel, etc...

Maintain a safe speed when driving up or down a hill. Use service brake to control speed when traveling down an incline. A sudden stop or change of direction may result in loss of control.

To prevent loss of control, do not move the vehicle direction selector while the vehicle is in motion. moving the direction selector will result in a sudden slowing of the vehicle.

Slow down before and during turns. All turns should be made at reduced speed.

Do not drive through water that is over 12 inches deep.To prevent inadvertent movement when the vehicle is to be left unattended, engage the parking brake, turn key to OFF position and remove key.

Make sure the key switch/direction selector is set to the Forward or Reverse before attempting to start the vehicle.

Always bring the vehicle to a complete stop before shifting the direction selector.

Do not take vehicle out of gear while in motion (coast).

Check area behind vehicle before operating in reverse.

All occupants must be seated with seat belts fastened and front side nets latched. Keep entire body inside vehicle and hold on while vehicle is in motion.

OPERATING PROCEDURES

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

BEFORE INITIAL USE

NOTICE

Record the four digit key number and store in a safe place. Individual keys can only be replaced if the key number is known. Without a key number, the entire ignition switch will have to be replaced if keys are lost.

Make a note of the key number in the event that new keys must be ordered. The key number is stamped into the key and on the face of the ignition switch. Both numbers must match.

Key Number

Be sure you understand the vehicle, its equipment and how to use it safely. Read, understand and follow the safety and operation label on the lower OPS cross bar. Although the vehicle has been designed to provide safe and reliable operation, maintaining good performance depends, to a large extent, on the operator.

Before a new vehicle is put into operation, the items shown in the ***INITIAL SERVICE CHART*** must be performed.

Remove the battery charger for the electric motor battery set. Read the operation instructions for the charger before charging the battery set.

Vehicle batteries, both the battery for the gas engine and the battery set that powers the electric motor, must be fully charged before initial use.

Check for correct tire inflation. See GENERAL SPECIFICATIONS.

Check the hydraulic brake fluid level.

Check the fuel tank under the seat and fill with unleaded gasoline (10% Ethanol blend is permissible).

Check for oil or fuel leaks that could have developed in shipment from the factory.

Remove the protective clear plastic, that protect the seat bottom and back rest during shipping, before placing the vehicle in service.

ITEM	SERVICE OPERATION
Battery Charger	Remove from vehicle and read operating instructions.
Batteries	Charge battery for gas engine and battery set for electric motor.
Seats	Remove protective plastic covering.
Brakes	Check operation, adjust if necessary. Check hydraulic brake fluid level.
Tires	Check air pressure, adjust if necessary. See vehicle specifications for tire pressure.
Fuel	Fill with correct fuel, regular unleaded, 10% or less Ethanol blend is permissible
Engine	Check oil level (Initial change after 20 hours)
Key	Record key number, store in safe location

Initial Service Chart

⚠ WARNING

Hydrogen gas is generated as a natural part of the lead acid battery charging process. A 4% concentration of hydrogen gas is explosive and could cause severe injury or death. Charging must take place in an area that is adequately ventilated (minimum of 5 air exchanges per hour).

To reduce the chance of battery explosion that could result in severe injury or death, never smoke around or charge batteries in an area that has open flame or electrical equipment that could cause an electrical arc.

Hydrogen gas is generated in the charging cycle of batteries and is explosive in concentrations as low as 4%. Because hydrogen gas is lighter than air, it will collect in the ceiling of buildings necessitating proper ventilation.

Five air exchanges per hour is considered the minimum requirement.

Never charge a vehicle in an area that is subject to flame or spark. Pay particular attention to natural gas or propane water heaters and furnaces.

PORTABLE CHARGER

See Appendix A for charger operation.

The portable charger will charge ONLY the battery set for the electric motor, not the single battery used for starting the gas engine.

⚠ WARNING

Use charger ONLY on 48 volt battery systems. Other usage may cause personal injury and damage. Lead acid batteries may generate explosive hydrogen gas during normal operation. Keep sparks, flames, and smoking materials away from batteries. Provide adequate ventilation during charging. Never charge a frozen battery. Study all battery manufacturers' specific precautions such as recommended rates of charge and removing or not removing cell caps while charging. charging. Never charge a frozen battery.

⚠ DANGER

Risk of electric shock. Connect charger power cord to an outlet that has been properly installed and grounded in accordance with all local codes and ordinances. A grounded outlet is required to reduce risk of electric shock – do not use ground adapters or modify plug. Do not touch uninsulated portion of output connector or uninsulated battery terminal. Disconnect the DC supply before making or breaking the connections to the battery while charging. Do not open or disassemble charger. Do not operate charger if the AC supply cord is damaged or if the charger has received a sharp blow, been dropped, or otherwise damaged in any way – refer all repair work to qualified personnel. Not for use by children.

Portable chargers are shipped with the vehicles. Prior to vehicle or charger operation, the charger **must** be removed and mounted on a platform or wall above the ground to permit maximum air flow around and underneath the charger. **A dedicated circuit is required for the charger.** Refer to the charger manual for appropriate circuit protection. For optimum performance and shortest charge times, place the charger in an area with adequate ventilation. The charger should also be placed in an area that will be relatively free of dirt, mud, or dust since accumulations within the fins of the charger will reduce their heat-dissipating qualities. Optimal cooling also occurs when the charger is placed on a horizontal surface with the fins vertical. More airflow from below the charger will help cool the fins, so placement above open areas or areas with cut-outs for airflow is desirable. If the charger is operated in an outdoor location, rain and sun protection must be provided. The charger may get hot during operation and must be placed such that risk of contact by people is reduced. The charger may be mounted on a wall or shelf using #10-M5 screws. The charger's status display must be visible to the user.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

NOTICE

Looping the power cord through the steering wheel when charging serves as a good reminder to store the cord out of the way when finished with charging. The plug can be damaged by driving over or catching the cord on the vehicle when driving away.

⚠ WARNING

An ungrounded electrical device may become a physical hazard that could result in an electrical shock or electrocution.

⚠ WARNING

To prevent a physical hazard that could result in an electrical shock or electrocution, be sure that the charger plug is not damaged and is inserted into a grounded receptacle.

The power (AC) cord is equipped with a grounded plug. Do not attempt to pull out, cut or bend the ground post.

The charging (AC) cord is equipped with a polarized connector that fits into a matching receptacle on the vehicle. The receptacle is located in the seat panel below the seat.

OPERATING THE VEHICLE

⚠ CAUTION

Improper use of the vehicle or the lack of proper maintenance may result in damage or decreased performance.

Read and understand the following warnings before attempting to operate the vehicle.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

⚠ WARNING

To reduce the possibility of severe injury or death resulting from loss of vehicle control, the following warnings must be observed:

When driving vehicle, consider the terrain, traffic conditions and the environmental factors which effect the terrain and the ability to control the vehicle.

Use extra care and reduced speed when driving on poor surfaces, such as loose dirt, wet grass, gravel, etc.

Maintain a safe speed when driving down hill. Use service brake to control speed when traveling down an incline. A sudden stop or change of direction may result in loss of control.

Slow down before and during turns. All turns should be made at reduced speed.

Never drive vehicle up, down, or across an incline that exceeds 14° (25% grade).

⚠ WARNING

To reduce the possibility of severe injury or death resulting from improper vehicle operation, the following warnings must be observed:

Refer to GENERAL SPECIFICATIONS for seating capacity.

Depressing accelerator pedal may cause inadvertent vehicle movement. Turn the key to the 'OFF' position whenever the vehicle is parked.

To prevent inadvertent movement when the vehicle is to be left unattended, engage the park brake, move direction selector to forward position, turn key to 'OFF' position and remove key.

Make sure that the direction selector is in correct position before attempting to start the vehicle.

Always bring the vehicle to a complete stop before shifting the direction selector.

Do not take vehicle out of 'gear' while in motion (coast).

Check the area behind the vehicle before operating in reverse.

All occupants must be seated and wearing their seat belts front side nets must be latched. Keep entire body inside vehicle and hold on while vehicle is in motion.

STARTING AND DRIVING

This vehicle has two separate powertrains that may be operated individually to provide two wheel drive or at the same time to provide four wheel drive. When the MODE switch is set to ELEC (top of switch pressed) only the front drive axle is engaged, drawing power from the battery set. With the MODE switch set to GAS (bottom of switch pressed) only the rear axle is engaged powered by the gas engine. With the MODE switch set to 4WD (switch in neutral position) both the electric and gas powertrains are engaged for four wheel drive.

While operating in GAS mode (rear wheel drive) the vehicle can be changed on the fly from 2 wheel rear drive to full time 4 wheel drive by setting the Mode Switch on the instrument panel to the 4WD (middle) position.

OPERATING PROCEDURES

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

⚠ WARNING

To reduce the possibility of roll-back which could result in severe injury or vehicle damage, do not release service brake until engine has started.

Electric Powertrain

To operate the vehicle in electric only mode:

- Set the Mode Switch (2) to ELEC.
- Place the key in the key switch and turn it to the ON/N position. The green LED above the N and the LED above the left corner of the Mode Switch should be lit.
- Turn the key to the desired direction; F for forward or R for reverse. The green LED above the direction letter should be lit to indicate the vehicle is ready to drive.
- Press the brake pedal and hold it down.
- Release the parking brake.
- Slowly press the accelerator pedal to start the electric motor while releasing pressure on the brake pedal.
- When the accelerator pedal is released the motor will stop and the vehicle will slow down and eventually stop. To stop the vehicle more quickly, press the brake pedal.

Gas Powertrain

To operate the vehicle in gas engine only mode:

- Set the Mode Switch (2) to GAS.
- Place the key in the key switch and turn it to the ON/N position. The green LED above the N and the LED above the left corner of the Mode Switch should be lit.
- Press the brake pedal and hold it down.
- Press and hold the start engine switch until the engine starts.
- Release the parking brake.
- Turn the key to the desired direction; F for forward or R for reverse. The green LED above the direction letter should be lit to indicate the vehicle is ready to drive.
- Release the parking brake.
- Slowly press the accelerator pedal while releasing the pressure on the brake pedal.
- When the accelerator pedal is released the vehicle will slow down and the engine will idle. To stop the vehicle more quickly, press the brake pedal.

⚠ CAUTION

Do not allow the starter to operate continuously for more than 10 seconds. Allow 30 seconds between starting attempts. If the vehicle does not start on the third attempt, turn the key switch off and determine the cause of the problem.

If the vehicle had been running and the engine does not start within 10 seconds, use the choke.

Starting the Vehicle on a Hill

⚠ WARNING

To reduce the possibility of roll-back which could result in severe injury or vehicle damage, do not release service brake until engine has started.

⚠ CAUTION

Do not hold vehicle on hill by using accelerator and motor/engine. This will cause premature and excessive wear to drive train components.

To reduce the possibility of permanent damage to the drive system, it is important to prevent excessive roll-back when starting the vehicle on a hill.

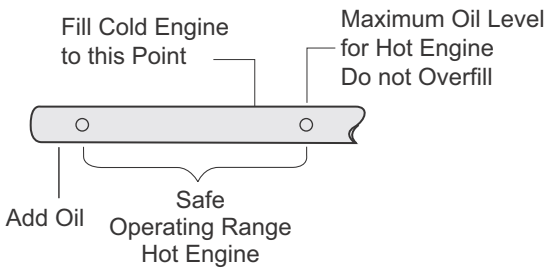
Place left foot on service brake and release the park brake. Depress accelerator with right foot and release the service brake by lifting left foot.

RUN-IN

Check for oil or fuel leaks that could have developed in shipment from the factory. Avoid full throttle starts and rapid acceleration until the engine has achieved operating temperature.

All engines consume more oil than normal during the first hours of operation. As internal moving parts are run-in, oil consumption should gradually decrease until the rate of consumption stabilizes.

Check the oil level per the Periodic Service Schedule. Add oil if the level on the dipstick indicates that oil is in the add oil range.



Check Oil Level on Dipstick

⚠ CAUTION

Do not overfill engine. Too much oil may cause smoking or allow oil to enter the air filter enclosure.

NOTICE

The oil dipstick/fill cap must be in place before operating the engine. Failure to install the dipstick/fill cap will result in oil becoming contaminated and/or being discharged into the engine compartment.

The oil should be changed in accordance with the Periodic Service Schedule while the engine is warm. See SERVICE AND MAINTENANCE and Appendix A (Subaru Engine Manual) for checking oil level and changing oil procedures.

STARTING THE VEHICLE WITH DISCHARGED BATTERY

⚠ WARNING

Do not attempt to 'jump start' a vehicle using another vehicle.

The vehicle is equipped with a starter/generator. When starting the engine, the starter/generator functions as a starter and with the engine running, it functions as a generator. Since the engine stops when the accelerator is released, **do not attempt jump starting**.

With the running times associated with this kind of vehicle, the generator is more than adequate to maintain the battery charge level. The generator is not designed to charge a discharged battery.

If the vehicle is equipped with additional lights and/or a strobe light that is used when the vehicle is not in motion, the starter/generator may not be adequate to maintain battery charge. If the vehicle battery has become discharged, it must be charged using a 12V charger that is rated at 10 amps or less. Observe all instructions provided by the manufacturer of the charger.

COASTING

⚠ WARNING

To reduce the possibility of severe injury or death from coasting at above recommended speeds, limit speed with service brake.

On steep hills, it is possible for the vehicle to coast at greater than normal speeds encountered on a flat surface. To reduce the possible loss of vehicle control and severe drivetrain damage, speeds should be limited to no more than the maximum governed speed on level ground (see GENERAL SPECIFICATIONS). Limit speed by applying pressure to the brake pedal.

FUEL

⚠ WARNING

To reduce the possibility of severe injury or death from improper fuel handling:

Do not smoke near the fuel tank.

Do not refuel near open flame or electrical items which could produce a spark.

Always handle gasoline in a well ventilated area.

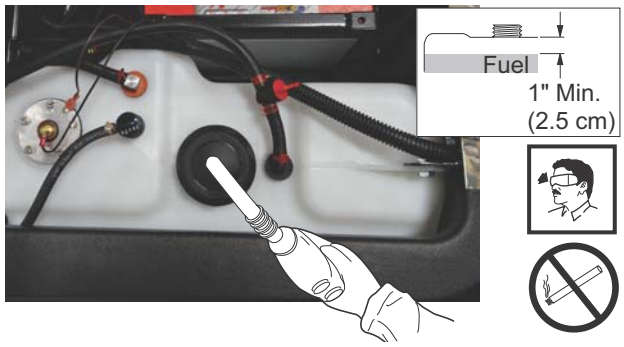
Always wear eye protection to protect against splashed fuel and fuel vapors.

Always allow adequate space for the expansion of gasoline. Leave at least 1" (2.5 cm) of space below bottom of filler neck.

Inspect fuel cap, tank and other components for leaks or deterioration that could cause a hazardous condition.

The fuel tank is located under the seat on the passenger side of the vehicle. Fill the tank with fresh, clean, automotive grade gasoline. High altitude or heavy use/load applications may benefit from higher octane gasoline.

Do not use gasoline which contains methanol.



⚠ CAUTION

Oxygenated or reformulated gasoline, is blended with alcohols or ethers. Excessive amounts of these blends can damage the fuel system or cause performance problems. If any undesirable operating symptoms occur, use gasoline with a lower percentage of alcohol or ether.

Use fresh regular grade unleaded fuel. Ethanol blend fuel up to 10% is permissible.

BATTERY

If the gas engine starting battery has become discharged, it must be charged using a 12 volt charger that is rated at 10 amps or less and in accordance with all instructions provided by the manufacturer of the charger.

TOP AND WINDSHIELD (IF EQUIPPED)

⚠ WARNING

The top does not provide protection from roll over or falling objects.

The windshield does not provide protection from tree limbs or flying objects.

⚠ CAUTION

To prevent damage to the vehicle, do not hold on to sun top struts and stand on body panels.

The sun top and windshield provide some protection from the elements; however, they will not keep the operator and passenger dry in a downpour. This vehicle is equipped with seat belts and an OPS (operator protection system) the sun top has not been designed to provide roll over protection. In addition, the sun top does not protect against falling objects nor does the windshield protect against flying objects and tree limbs. Keep arms and legs inside of vehicle while it is moving.

TOWING A TRAILER

The vehicle is equipped with a receiver that can be fitted with a standard 1 7/8” ball. The trailer and its load must not exceed 1200 lbs (544 kg) and no more than 50 lbs (23 kg) tongue weight may be attached to the hitch. Remember that the overall capacity of the vehicle, operator, passenger, contents of load bed and accessories must be reduced to compensate for the trailer and load.

The range of motion of the trailer is limited by the ball and hitch. The trailer should not be used on rough trails or over objects such as logs, large rocks, holes, etc.

Never install baskets or extensions using the hitch receivers. Such items will change the performance characteristics of vehicle and result in unsafe handling, possible roll over or vehicle damage.

TERRAIN

The vehicle is NOT designed for use on public roads. The vehicle may be used on established trails or open terrain that is free from stumps, large rocks or holes. The vehicle should not be used to cross water that is more than 12 inches (30 cm) deep or fast moving water.

Be aware of steep slopes, overhanging limbs or danger of fire when the gas engine is operated over dry combustible material. Consult dealer for an available spark arrestor for this vehicle.

When traveling up or down steep slopes do not attempt to turn the vehicle around on the slope. Vehicle stopping distance increases when driving on wet gras, dirt roads or loose surfaces.

DUMP BED

⚠ WARNING

Passengers should never be allowed to ride in the dump bed. Severe injury or death could result if they should fall out or the vehicle is involved in an accident or sudden maneuver.

Be careful when loading the vehicle. Secure loads to prevent shifting. Do not overload vehicle. A dump bed warning

label is affixed to the inside of the bed on the front panel.

This label must be understood and observed at all times for safe operation of the vehicle. The dump bed is limited to a maximum load of 500 lbs. The load must be positioned in the bed as far forward as possible, it's center of gravity must not be higher than 12" above the bed floor, and securely fastened down. Failure to follow these instructions could cause personal injury, damage to the vehicle and/or cause the vehicle to tip over. Operate the vehicle with awareness of the load.

Do not drive the vehicle with the dump bed raised or with the tailgate unsupported.

Use caution when backing up to the edge of a drop off, such as a loading dock or ravine. A misjudgment of distance or an unstable surface could result in the vehicle falling backwards.

Always insure that no one is behind or close to the dump bed while the electric dump mechanism is being operated.

REAR FACING SEAT / LOAD DECK

⚠ WARNING

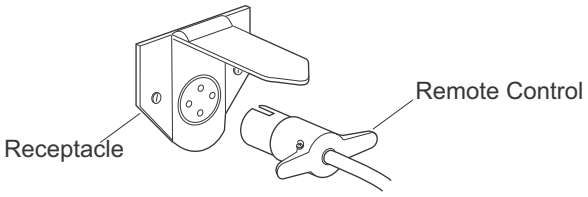
Passengers should never be allowed to ride on the load deck. Severe injury or death could result if they should fall out or the vehicle is involved in an accident or sudden maneuver.

The rear facing seat will accommodate two passengers with a combined weight of less than 400 pounds or, the seat bottom may be folded out to form a load deck. When using the load deck, position the load as far forward as possible and securely fastened down. The maximum load is 250 lbs and the center of gravity must not be higher than 12" above the load deck.

WINCH (IF EQUIPPED)

This vehicle may be equipped with an optional winch. Read, understand and follow all of the information supplied with the winch on the operation and use of the winch before attempting to operate it.

The winch may have a remote control that plugs into the receptacle in the driver side glove box.



Operation

A winch may be used for a number of purposes, including pulling the vehicle if it loses traction on unsuitable terrain.

⚠ WARNING

Improper use of the winch could result in a number of conditions that could cause severe injury or death to operator, occupants of vehicle or bystander.

It is impossible to predict all conditions that the winch could be used, therefore the following warnings should not be considered as complete. Before operating the winch, consider the possible dangers and take precautions to protect yourself, your passenger and any bystanders.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

⚠ WARNING

To prevent severe injury or death to operator, occupants or bystanders, select the object to which the cable is attached with the following considerations:

Make sure the object cannot be pulled over or otherwise damaged.

The object the winch cable is attached to could fall on the vehicle and it's occupants.

If attaching the winch to a dead tree, a section could fall.

When pulling vehicle with winch, pull straight only. Do not permit the cable to contact the side of the drum.

Do not pull vehicle at an angle. If the vehicle is pulled at an angle, it could turn over causing severe injury or death to anyone in the area. The winch cable could also become overstressed and break causing severe injury or death to anyone struck by the cable.

The rear drive axle is equipped with a manually operated locking differential. With the differential unlocked, if one drive wheel looses traction, all available power is transferred to that wheel until it regains traction. In normal driving this is not a problem. However, if the vehicle becomes 'hung up' on an object, the vehicle will stop. With the differential locked, power is distributed to both drive wheels at all times. If both drive wheels lose traction as a result of the vehicle becoming 'hung up' on an object, the vehicle will stop. If the vehicle cannot be pushed off the obstruction, it will have to be pulled off using the winch.

⚠ WARNING

To prevent severe injury or death, read and understand the following before attempting to use the winch:

The winch is not intended to be used in any hoisting operation.

The rolling load capacity of the winch decreases with the steepness of the slope.

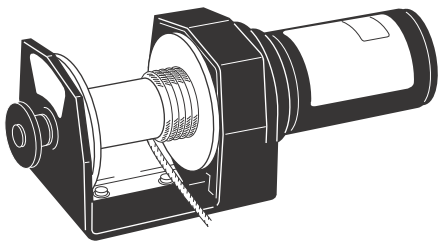
The winch is designed for intermittent duty only.

The electric motor should not be allowed to become excessively hot. If the motor becomes uncomfortably hot to the touch, stop winching and allow the motor to cool.

Always wear thick leather gloves when handling the wire cable.

Replace frayed wire cable with a direct factory replacement only.

Never operate the winch with less than five (5) full turns of cable around the drum.



If the winch motor stalls from overloading, do not continue to activate the winch remote control. The wire cable may become overstressed.

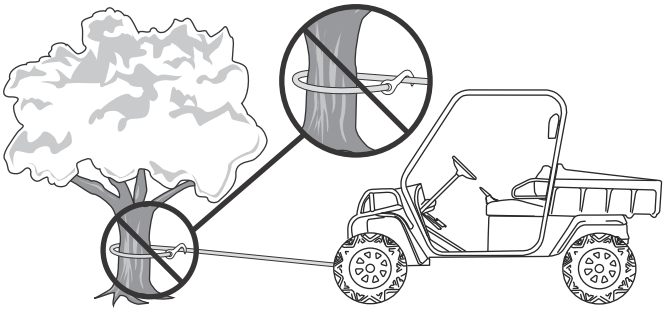
Do not attempt to pull loads exceeding the manufacturers maximum load rating.

Have all persons and pets leave the area while operating winch. Never allow anyone to remain in the vehicle.

To prevent damage to the wire cable, never hook the cable to itself. Always use a nylon sling.

Stay clear of the winch, the cable and the cable hook. Place a heavy cloth, jacket or blanket over the cable to act as a damper should the cable break when operating the winch.

When operating the winch, keep the entire area in view.



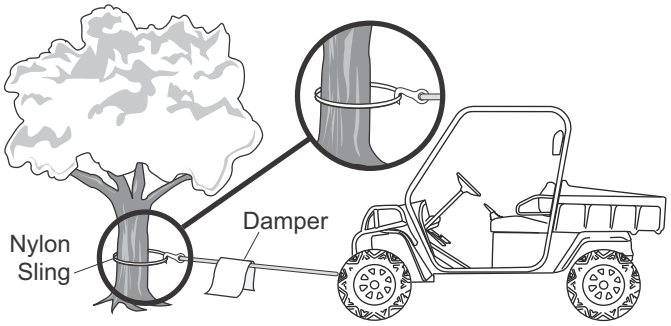
Do Not Hook Cable to Itself

Never release the free spool clutch while the cable is under load.

Never work around the winch drum or the winch cable while it is under tension.

Unplug the winch switch before working on the winch drum in order to prevent inadvertent operation.

When operating winch, take up slack slowly. Stop winch before cable becomes tight and inspect all winching connections. Check winch attachment, hook attachment, nylon sling (if required) and load attachment.



Use a Nylon Sling and Install a Damper when Winching

Do not pull at an angle. This will cause the wire cable to pile up on one end of the winch. This may jam the winch causing damage to the cable and/or the winch. Pulling the vehicle at an angle can cause damage to the front suspension and may cause the vehicle to overturn. When pulling vehicle, pull straight only.

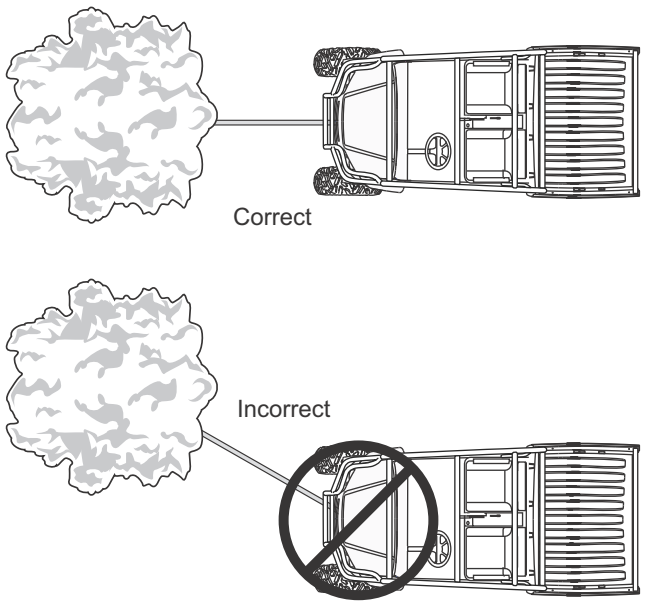
If the vehicle is being used as an anchor to winch a load, it should have the parking brake set and chocks installed on all wheels.

Never use the winch to lift people or other overhead loads.

Do not use the winch to secure loads. Use a tie down designed for the job.

Do not apply shock loads to the winch.

Do not attempt to modify or weld the winch.



Do Not Pull at Angle

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

Notes:

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

Notes:

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

VEHICLE CLEANING AND CARE

CAUTION

When pressure washing vehicle, do not use pressure in excess of 700 psi or spray directly onto controls and switches. To prevent cosmetic damage, do not use any abrasive or reactive solvents to clean plastic parts. Keep pressure washer nozzle at least 12" (30 cm) from the surface.

It is important that proper techniques and cleaning materials be used.

Normal cleaning of vinyl seats and plastic or rubber trim requires the use of a mild soap solution applied with a sponge or soft brush and wipe with a damp cloth.

Removal of oil, tar, asphalt, shoe polish, etc. will require the use of a commercially available vinyl/rubber cleaner.

The painted surfaces of the vehicle provide attractive appearance and durable protection. Frequent washing with luke-warm or cold water is the best method of preserving the painted surfaces.

Do not use hot water, strong soap or harsh chemical detergents.

Rubber parts should be cleaned with non-abrasive household cleaner.

Occasional cleaning and waxing with non-abrasive products designed for 'clear coat' automotive finishes will enhance the appearance of vehicles with gloss/clear coated painted surfaces. Vehicles with matt or camouflaged surfaces should not be waxed.

Corrosive materials can collect on the underbody of the vehicle. These materials will accelerate corrosion of underbody parts. It is recommended that the underbody be flushed occasionally with plain water. Thoroughly clean any areas where mud or other debris can collect. Sediment packed in closed areas should be loosened to ease it's removal, tak-ing care not to chip or otherwise damage the paint.

TRANSPORTING VEHICLE

WARNING

Be sure vehicle and all contents are secure before transporting a vehicle.

Never ride on the vehicle being transported.

Always remove windshield (if equipped) before transporting.

Maximum speed with sun top installed is 70mph (112 kph).

If the vehicle is to be transported at highway speeds, the windshield must be removed and the seat bottom secured. When transporting vehicle below highway speeds, check for tightness of hardware and cracks in sun top at mounting points.

The rated capacity of the trailer or truck must exceed the weight of the vehicle (see GENERAL SPECIFICATIONS for vehicle weight) and load plus 1000 lbs. (454 kg).

Secure the vehicle using ratchet tie downs.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

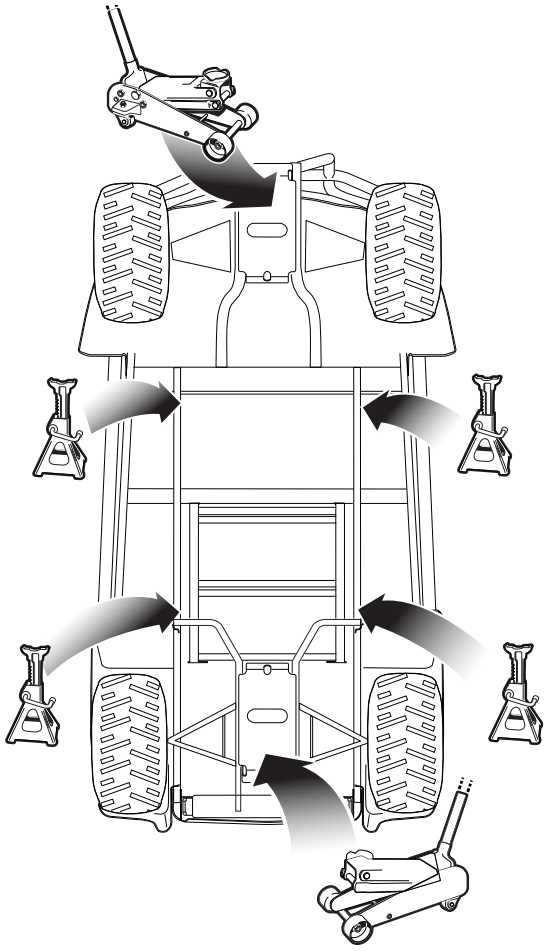
ROUTINE MAINTENANCE

Preventive maintenance, applied at recommended intervals, is the best guarantee for keeping the vehicle dependable.

This vehicle will give years of satisfactory service, providing it receives regular maintenance. Refer to the PERIODIC SERVICE SCHEDULE for appropriate service intervals.

LIFTING THE VEHICLE

Tool List	**Qty.**
Floor Jack	1
Jack Stands	4
Wheel Chocks	4



⚠ WARNING

To reduce the possibility of severe injury or death from a vehicle falling from a jack:

Always place chocks in front and behind the wheels not being raised.

Be sure the vehicle is on a firm and level surface.

Never get under a vehicle while it is supported by a jack.

Use jack stands and test the stability of the vehicle on the stands.

Use extreme care since the vehicle is extremely unstable during the lifting process.

⚠ CAUTION

When lifting the vehicle, position the jacks and jack stands at the areas indicated.

Remove payload from vehicle before lifting. No person(s) should be in or on the vehicle while lifting.

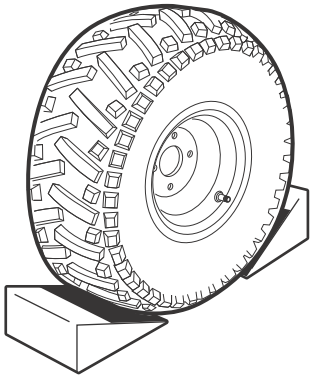
To raise the entire vehicle, install the wheel chocks in front and behind each front wheel. Center the jack under rear differential skid plate, raise the vehicle and position jack stands under the rear frame locations indicated.

Lower jack and test stability of the vehicle on two jack stands.

Place the jack under the center front skid plate, raise the vehicle and position jack stands under each front frame rail just behind the front cross piece.

Lower jack and test stability of vehicle on all four jack stands.

To lower the vehicle reverse the lifting sequence.



WHEELS AND TIRES

⚠ WARNING

A tire explosion can cause severe injure or death. Never exceed the inflation pressure rating on the tire sidewall.

To reduce the possibility of tire explosion, pressurize the tire with small amounts of air applied intermittently to seat beads. Due to the low volume of the small tires, over inflation can occur in seconds. Never exceed the tire manufacturer's recommendation when seating a bead. Protect face and eyes from escaping air when removing a valve core.

Use caution when inflating tires. Over inflation could cause the tire to separate from the wheel or cause the tire to explode, either of which could cause severe injury.

To reduce the possibility of severe injury caused by a broken socket, use only sockets designed for impact wrench use for removal and installation of wheels.

Tire Repair

Tool List	Qty.	Tool List	Qty.
Lug Wrench, 3/4"	1	Impact Socket, 3/4"	1
Impact Wrench	1	Torque Wrench, ft. lbs	1

Generally, the most cost effective way to repair a flat tire resulting from a puncture in the tread portion is to use a commercial tire plug.

If the tire is flat, raise vehicle and remove wheel. Refer to 'Lifting the Vehicle' for proper lifting procedure and safety information. Inflate tire to the maximum recommended pressure, immerse tire in water to locate the leak and mark the leak with chalk. Insert tire plug in accordance with manufacturer's specifications.

Use caution when inflating tires. Due to the low volume of the small tires, over inflation can occur in seconds. Over inflation could cause the tire to separate from the wheel or cause the tire to explode.

The recommended tire inflation pressure is 12 psi. Under no condition should inflation pressure be higher than recommended on tire sidewall. All four tires should have the same pressure for optimum handling characteristics. Be sure to install the valve stem cap after checking or inflating tires. The vehicle is fitted with low volume tubeless tires mounted on one piece wheel rims.

Wheel Installation

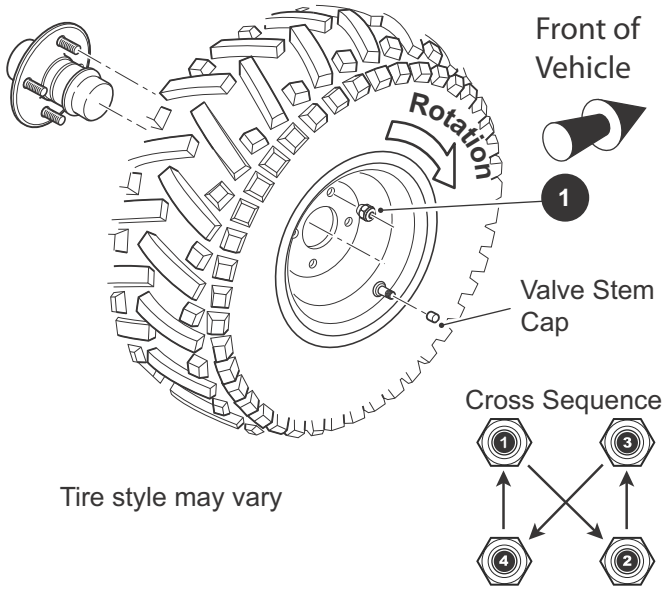
⚠ CAUTION

To reduce the possibility of component damage, do not tighten lug nuts to more than 85 ft. lbs. (115 Nm) torque.

NOTICE

It is important to flow the 'cross sequence' pattern when installing lug nuts. This will assure even seating of the wheel against the hub.

With the valve stem to the outside, mount the wheel onto the hub with lug nuts (1). Finger tighten lug nuts in a 'cross sequence' [pattern. Tighten all lug nuts to 50 - 85 ft. lbs (68 - 115 Nm) torque in 20 ft. lbs (27 Nm) increments following the 'cross sequence' pattern.



Tire style may vary

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

Unidirectional Tires

Unidirectional tires may be identified by a directional arrow on the sidewall. Be sure to position the wheel on the hub correctly with the arrow indicating the direction of rotation when moving forward.

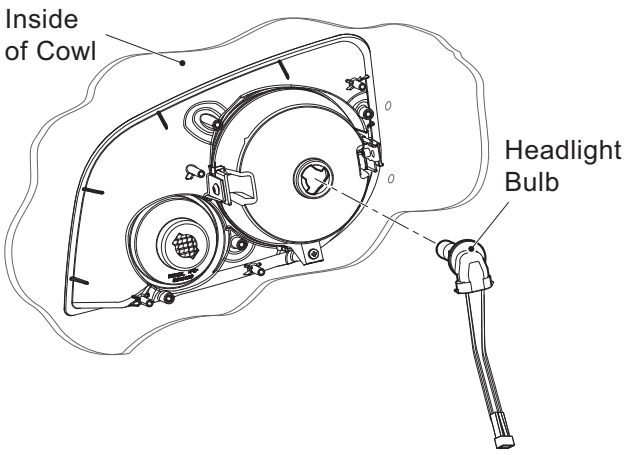
LIGHT BULB REPLACEMENT

⚠ CAUTION

To reduce the possibility of premature bulb failure, do not touch new bulbs with bare fingers. Use clean, dry tissue or a paper towel to handle the glass portion of the bulb.

Headlight

For vehicles equipped with lights mounted in the cowl, locate bulb socket on backside of light and turn bulb socket a quarter turn counterclockwise to unlock and pull out bulb and socket. Insert new bulb and rotate socket a quarter turn clockwise to secure.



Taillight Replacement

Make sure the vehicle key switch is in the OFF position and that the key has been removed.

The taillight contains an LED light board rather than a light bulb. If the LEDs burn out, the entire light assembly will need replacement.

BRAKES

This vehicle is equipped with four wheel hydraulic disc brakes. The parking brake is hand operated. Check the fluid level at intervals specified in the PERIODIC SERVICE SCHEDULE; if fluid leaks are noticed or the brake pedal seems soft check the fluid level immediately.

Master Cylinder

The master cylinder/reservoir is located under the front of the vehicle near the driver side front wheel well. Before removing the reservoir cap, clean any dirt or debris from around the reservoir and cap.

Check fluid level in the reservoir. The fluid level should be between the MAX and MIN lines. Use fresh DOT 3 brake fluid only.

To fill the reservoir, remove the cap to expose the rubber diaphragm, remove the diaphragm, making sure to keep it clean. Add enough brake fluid to bring the level up to the MAX line. Collapse and replace the diaphragm and install the reservoir cap. Clean any spilled brake fluid from the area.

GAS POWERTRAIN

Engine

This vehicle is powered by a 28hp Subaru V Twin Cylinder OHV engine. For all maintenance procedures for the gas engine refer to the Subaru Manual located in Appendix A of this owner's guide.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

ELECTRIC POWERTRAIN

⚠ WARNING

To reduce the possibility of severe injury or death from improper servicing techniques:

DO NOT attempt any type of servicing operations before reading all notes, cautions and warnings in this manual.

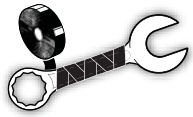
Any servicing requiring adjustments to be made to the powertrain while the motor is running must be made with both drive wheels raised and vehicle properly supported on jack stands.

To reduce the possibility of motor damage, never operate vehicle at full throttle for more than 4 - 5 seconds while vehicle is in a 'no load' condition.

Reduce the possibility of accidental starting by disconnecting battery at negative terminal before servicing.

Wear eye protection when working on the vehicle. Use extra care when working around batteries, or using solvents or compressed air.

To reduce the possibility of causing an electrical arc, which could result in a battery explosion, turn off all electrical loads from the battery before removing battery wires.



Wrap wrenches with vinyl tape to reduce the possibility of a dropped wrench 'shorting out' a battery, which could result in an explosion.

The electrolyte in a battery is an acid solution which can cause severe burns to the skin and eyes. Treat all electrolyte spills to the body and eyes with extended flushing with clear water. Contact a physician immediately.

Any electrolyte spills should be neutralized with a solution of 2 teaspoons (10 ml) sodium bicarbonate (baking soda) dissolved in 1 quart (1 liters) of water and flushed with water.

Aerosol containers of battery terminal protectant must be used with extreme care. Insulate metal container to reduce the possibility of can contacting battery terminals which could result in an explosion.

System Test

At monthly intervals, test the controller by setting the MODE switch to ELEC and allowing the vehicle to roll down an incline with the accelerator pedal released. Braking force should be felt at approximately 2 mph (3 kph) indicating that the system is functioning. If vehicle speed continues to rise, press on the brake pedal to stop the vehicle and have the vehicle inspected by a trained mechanic.

AXLES

The only maintenance required for the first five years is the periodic inspection of the axles for lubricant leakage. Unless leakage is evident, the lubricant need only be replaced after five years, more often if vehicle is used in harsh environments. Refer to the Service and Repair manual for the fluid replacement procedure.

⚠ CAUTION

The front and rear axle do NOT use the same lubricant. Extreme care should be used when topping off or refilling the axles.

The axles use different lubricants. Do NOT mix oils in an axle. The front axle contains 14 ounces of 90 weight gear oil, the rear axle contains 22 ounces of SAE 80 weight gear oil.

Checking the Lubricant Level

Clean the area around the check/fill plug and remove the plug. The correct lubricant level is just below the bottom of the threaded hole. If lubricant is low, add lubricant as required. Add lubricant slowly until it starts to seep from the hole. Install the check/fill plug.

BATTERY CHARGING AND MAINTENANCE

Safety

Always observe the following warnings when working on or near batteries.

⚠ WARNING

To prevent battery explosion that could result in severe personal injury or death, keep all smoking materials, open flames or sparks away from the batteries.

Hydrogen gas is formed when charging batteries. Do not charge batteries without adequate ventilation. A 4% concentration of hydrogen gas is explosive.

Be sure that the key switch is off and all electrical accessories are turned off before starting work on the vehicle.

Never disconnect a circuit under load at a battery terminal.

Batteries are heavy. Use proper lifting techniques when moving them. Always lift the battery with a commercially available battery lifting device. Use care not to tip batteries when removing or installing them; spilled electrolyte can cause burns and damage.

The electrolyte in a storage battery is an acid solution which can cause severe burns to the skin and eyes. Treat all electrolyte spills to the body and eyes with extended flushing with clear water. Contact a physician immediately.

Always wear a safety shield or approved safety goggles when adding water or charging batteries.

Any electrolyte spills should be neutralized with a solution of 1/4 cup (60 ml) sodium bicarbonate (baking soda) dissolved in 1 1/2 gallons (6 liters) of water and flushed with water.

Overfilling batteries may result in electrolyte being spilled from the battery during the charge cycle. Expelled electrolyte may cause damage to the vehicle and storage facility.

Aerosol containers of battery terminal protectant must be used with extreme care. Insulate metal container to prevent can from contacting battery terminals which could result in an explosion.

Wrap wrenches with vinyl tape to prevent the possibility of a dropped wrench from 'shorting out' a battery, which could result in an explosion and severe personal injury or death.

Battery Disposal

Lead-acid batteries are recyclable. Return whole scrap batteries to distributor, manufacturer or lead smelter for recycling. For neutralized spells, place residue in acid-resistant containers with absorbent material, sand or earth and dispose of in accordance with local, state and federal regulations for acid and lead compounds. Contact local and/or state environmental officials regarding disposal information.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

Battery

A battery does not store electricity, but is able to produce electricity as the result of a chemical reaction which releases stored chemical energy in the form of electrical energy. The chemical reaction takes place faster in warm conditions and slower in cold conditions. Temperature is important when conducting tests on a battery and test results must be corrected to compensate for temperature differences.

As a battery ages, it still performs adequately except that its **capacity** is diminished. Capacity describes the time that a battery can continue to provide its design amperes from a full charge.

A battery has a maximum life, therefore good maintenance is designed to maximize the **available** life and reduce the factors that can reduce the life of the battery.

Battery Maintenance

Tool List	Qty.	Tool List	Qty.
Insulated Wrench, 9/16”	1	Battery Carrier	1
Hydrometer	1	Battery Maintenance Kit P/N 25587-G01	1
Battery Protective Spray	1		

At Each Charging Cycle

⚠ WARNING

To reduce the possibility of fire, never attach a battery charger to a vehicle that is to be unattended beyond the normal charging cycle. Overcharging could cause damage to the vehicle batteries and result in extreme overheating. The charger should be checked after 24 hours and unplugged after the charge cycle is complete.

Before charging the batteries, inspect the plug of the battery charger and vehicle receptacle housing for dirt or debris.

Charge the batteries after each day’s use.

Monthly

- Inspect all wiring for fraying, loose terminations, corrosion or deterioration of insulation.
- Check that the electrolyte level is correct and add suitable water as required.
- Clean the batteries and wire terminations.
- Coat battery terminals with commercially available protectant.

Electrolyte Level and Water

The correct level of the electrolyte is 1/2” (13 mm) above the plates in each cell.

This level will leave approximately 1/4” - 3/8” (6 - 10 mm) of space between the electrolyte and the vent tube. The electrolyte level is important since any portion of the plates exposed to air will be ruined beyond repair. Also avoid filling with too much water, which will result in electrolyte being forced out of the battery due to gassing and a decrease in volume of the electrolyte that results from the charging cycle.

⚠ CAUTION

DO NOT overfill batteries. The charging cycle will expel electrolyte and result in component damage.

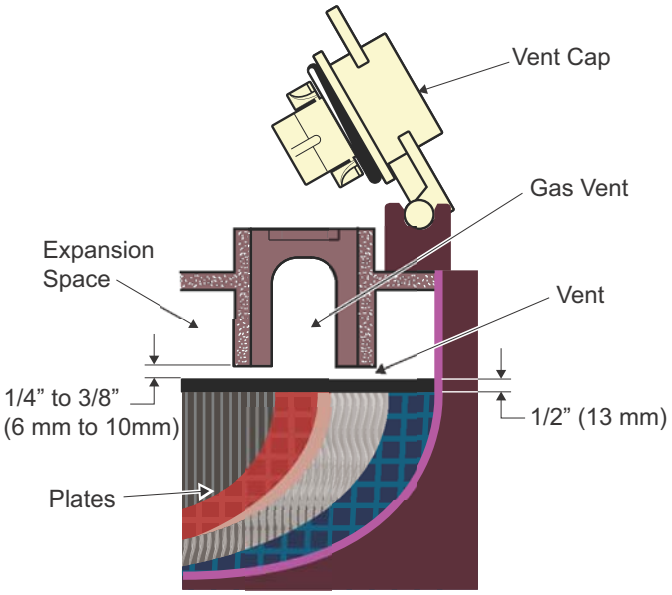
A battery being charged will 'gas' with the majority of the gassing taking place at the end of the charging cycle. This gas is hydrogen with is lighter than air. Water and sulfuric acid droplets will be carried out of the battery vents by the hydrogen gas, however, this loss is minimal. If the battery electrolyte level is too high, the electrolyte will block the vent tube and the gas will force it out of the vent tube and battery cap. The water will evaporate but the sulfuric acid will remain where it can damage vehicle components and the storage facility floor. Sulfuric acid loss will weaken the concentration of acid within the electrolyte and reduce the life of the battery,

Over the life of the battery, a considerable amount of water is consumed. It is important that the water used be pure and free of contaminants that could reduce the life of the battery by reducing the chemical reaction. The water must be distilled or purified by an efficient filtration system. Water that is not distilled should be analyzed and, if required, filtration installed to permit the water to meet the requirements of the water purity table.

Even if the water is colorless, odorless, tasteless and fit for drinking, the water should be analyzed to see that it does not exceed the impurity levels specified in the table.

Impurity	Parts Per Million
Color	Clear
Suspended	Trace
Total Solids	100
Calcium & Magnesium Oxides	40
Iron	5
Ammonia	8
Organic & Volatile Matter	50
Nitrites	5
Nitrates	10
Chloride	5

Water Purity Table



Electrolyte level should be at least 1/2" (13mm) above the plates and 1/4" to 3/8" (6 to 10 mm) below vent.

Correct Electrolyte Level

⚠ WARNING

The electrolyte in a storage battery is an acid solution which can cause severe burns to the skin and eyes. Treat all electrolyte spills to the body and eyes with extended flushing with clear water. Contact a physician immediately.

Any electrolyte spills should be neutralized with a solution of 1/4 cup (60 ml) sodium bicarbonate (baking soda) dissolved in 1 1/2 gallons (6 liters) of water and flushed with water.

Always wear a safety shield or approved safety goggles when adding water or charging batteries.

Battery Cleaning

⚠ CAUTION

To prevent battery damage, be sure that all battery caps are tightly installed.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

To reduce the possibility of damage to vehicle or floor, neutralize acid before rinsing battery.

To reduce the possibility of damage to electrical components while cleaning, do not use a pressure washer.

Cleaning should take place per the Periodic Service Schedule.

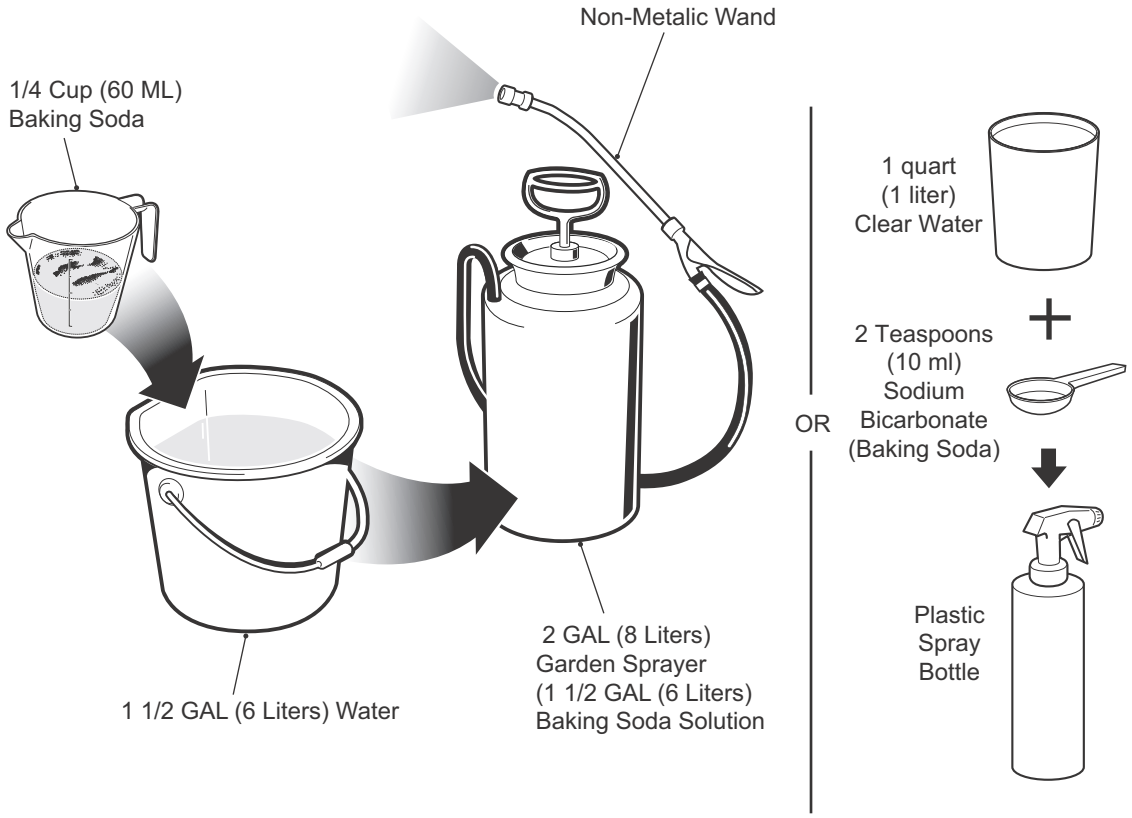
When cleaning the outside of the batteries and terminals, do not use a water hose without first spraying the batteries with a solution of baking soda (sodium bicarbonate) and water to neutralize any acid deposits. Use of a water hose without first neutralizing the acid will move the acid from the top of the batteries to another area of the vehicle or storage facility, where it will attack the metal structure or the concrete/asphalt floor. After hosing down the batteries, a residue will be left on the batteries which is conductive and will contribute to the discharge of the batteries.

NOTICE

To reduce the possibility of battery explosion that could result in severe injury or death, do not use metallic spray wand to clean battery and keep all smoking materials, open flame or sparks away from the battery.

The correct cleaning technique is to spray the top and sides of the batteries with a solution of baking soda and water. This solution is best applied with a garden-type sprayer equipped with a non-metallic spray wand or plastic spray bottle. The solution should consist of 1/4 cup (60 ml) of baking soda mixed with 1 1/2 gallons (6 liters) of clear water. In addition to the batteries special attention should be paid to metallic components adjacent to the batteries, these should also be sprayed with the baking soda solution.

Allow the solution to set for at least three minutes; use a soft bristle brush or cloth to wipe the tops of the batteries in order to remove any residue that could cause the self-discharge of the battery. Rinse the entire area with low pressure clear water. All of the items required for complete battery cleaning and watering are contained in the Battery Maintenance Kit (P/N 25587-G01).



Preparing Acid Neutralizing Solution

Cleaning should take place once a month or more often under extreme conditions. After batteries are clean and dry, the terminals should be coated with a commercially available protectant. **Aerosol containers of battery terminal protectant must be used with extreme care. Insulate the metal container to prevent the can from contacting the battery terminals.**

Battery Removal and Replacement

Remove battery hold downs and cables. Lift out batteries with a commercially available lifting device.

If the batteries have been cleaned and any acid in the battery rack areas neutralized as recommended, no corrosion to the battery racks or surrounding area should be present. Any corrosion found should be immediately removed with a

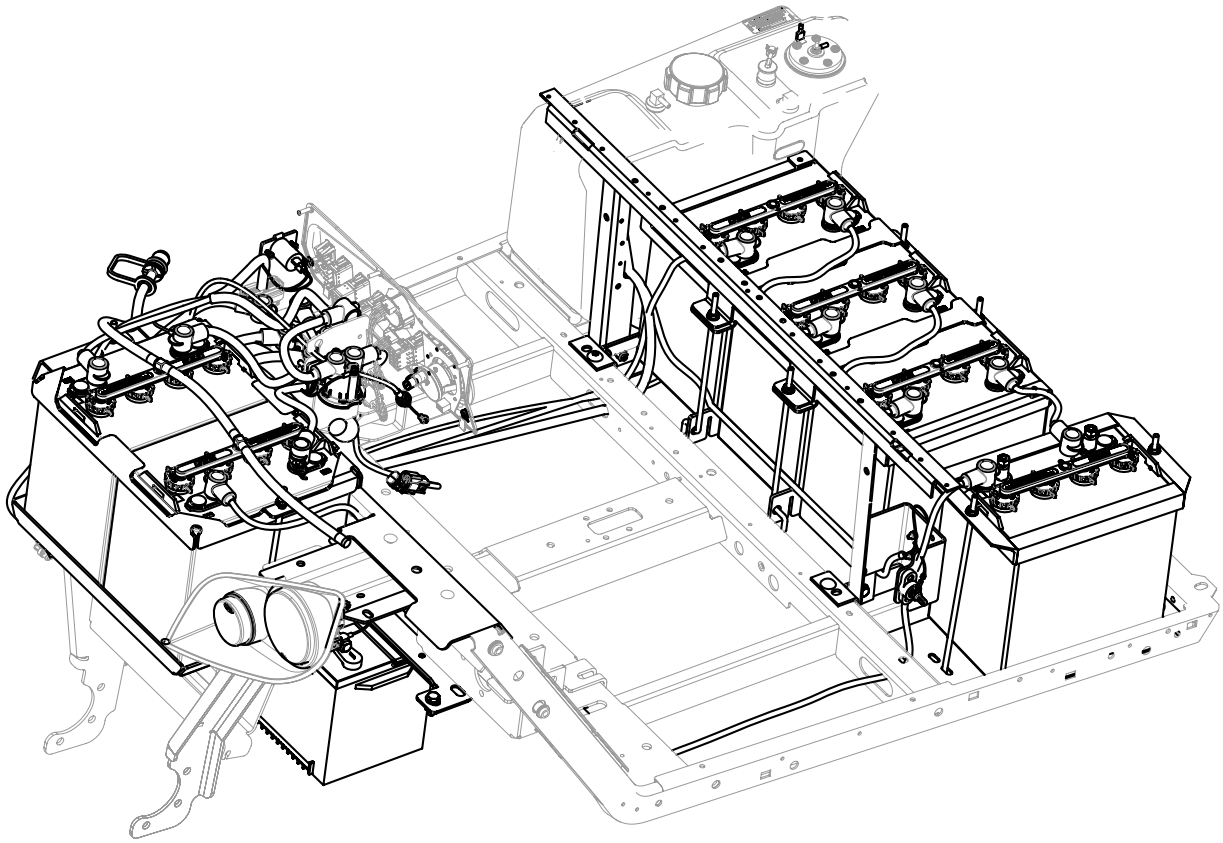
putty knife and a wire brush. The area should be washed with a solution of sodium bicarbonate (baking soda) and water and thoroughly dried before priming and painting with a corrosion resistant paint.

The batteries should be placed into the battery racks and the battery hold downs tightened to 45 - 55 in. lbs. (5 - 6 Nm) torque, to prevent movement but not tight enough to cause distortion of the battery cases.

Inspect all wires and terminals. Clean any corrosion from the battery terminals or the wire terminals with a solution of sodium bicarbonate (baking soda) and brush clean if required.

Use care to connect the battery wires as shown.

Tighten the battery post hardware to 90 - 100 in. lbs. (6 -8 Nm) torque. Do not over-torque the terminal stud nut, this will cause a “mushroom” effect on the battery post which will prevent the terminal nut from being properly tightened. Protect the battery terminals and battery wire terminals with a commercially available coating.



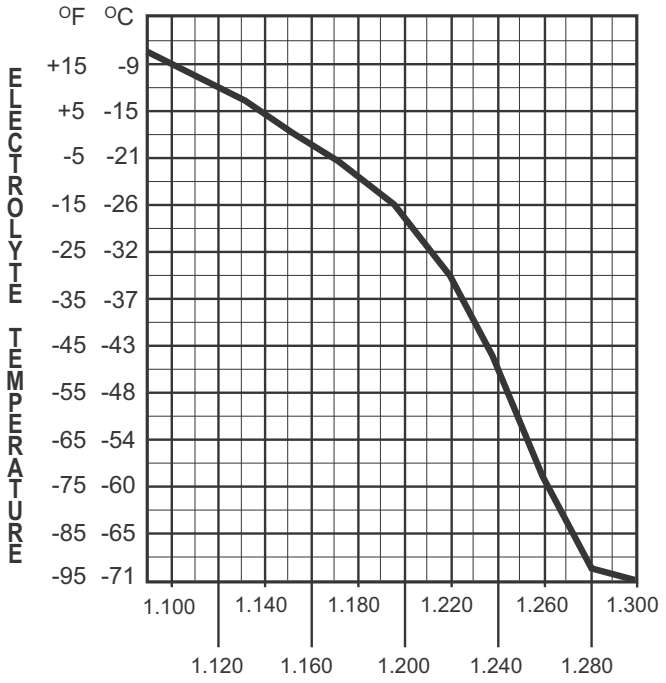
BATTERY CONFIGURATION

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

⚠ WARNING

To prevent battery explosion that could result in severe personal injury or death, extreme care must be used with aerosol containers of battery terminal protectant. Insulate the metal container to prevent the metal can from contacting battery terminals which could result in an explosion.

In winter conditions, the battery must be fully charged to prevent the possibility of freezing. A fully charged battery will not freeze in temperatures above -75° F (-60° C). Although the chemical reaction is slowed in cold temperatures, the battery must be stored fully charged, and disconnected from any circuit that could discharge the battery. The controller should be disconnected from the batteries by setting the Run-Tow/Maintenance/Storage switch, located under the passenger seat, to the 'TOW/MAINTENANCE/STORAGE' position. For portable chargers, disconnect the charging plug from the vehicle receptacle. For on-board chargers, disconnect the charging harness from the batteries. The batteries must be cleaned and all deposits neutralized and removed from the battery case to prevent self discharge. The batteries should be tested or recharged at thirty day minimum intervals.



SPECIFIC GRAVITY ELECTROLYTE FREEZING POINT

Battery Charging

The battery charger is designed to fully charge the battery set. If the batteries are severely deep cycled, some automatic battery chargers contain an electronic module that may not activate and the battery charger will not function. Automatic chargers will determine the correct duration of charge to the battery set and will shut off when the battery set is fully charged. Always refer to the instructions of the specific charger used.

Before charging, the following should be observed:

⚠ CAUTION

Do not overfill batteries. The charging cycle will expel electrolyte and result in component damage.

- The electrolyte level in all cells must be at the recommended level and cover the plates.
- The charging must take place in an area that is well ventilated and capable of removing the hydrogen gas that is generated by the charging process. A **minimum** of five air exchanges per hour is recommended.
- The charging connector components must be in good condition and free from dirt or debris.
- The charger connector must be fully inserted into the vehicle receptacle.
- The charger connector/cord set is protected from damage and is located in an area to prevent injury that may result from personnel running over or tripping over the cord set.
- The charger is automatically turned off during the connect/disconnect cycle and therefore no electrical arc is generated at the DC plug/receptacle contacts.

NOTICE

In some portable chargers, there will be a rattle present in the body of the charger DC plug. This rattle is caused by an internal magnet contained within the charger plug. The magnet is part of the interlock system that prevents the vehicle from being driven when the charger plug is inserted in the vehicle charging receptacle.

AC Voltage

Battery charger output is directly related to the input voltage. If multiple vehicles are receiving an incomplete charge in a normally adequate time period, low AC voltage could be the cause and the power company should be consulted.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

Troubleshooting

In general, troubleshooting will be done for two distinct reasons. First, a battery that performs poorly and is outside of the manufacturers specification should be identified in order to replace it under the terms of the manufacturer's warranty. Different manufacturers have different requirements. Consult the battery manufacturer or the manufacturer's representative for specific requirements.

The second reason is to determine why a particular vehicle does not perform adequately. Performance problems may result in a vehicle that runs slowly or in a vehicle that is unable to operate for the time required.

A new battery must **mature** before it will develop its maximum capacity. Maturing may take up to 100 charge/discharge cycles. After the maturing phase, the older a battery gets, the lower the capacity. The only way to determine the capacity of a battery is to perform a load test using a discharge machine following manufacturer's recommendations.

A cost effective way to identify a poorly performing battery is to use a hydrometer to identify a battery in a set with a lower than normal specific gravity. Once the particular cell or cells that are the problem are identified, the suspect battery can be removed and replaced. At this point there is nothing that can be done to salvage the battery; however, the individual battery should be replaced with a good battery of the same brand, type and approximate age.

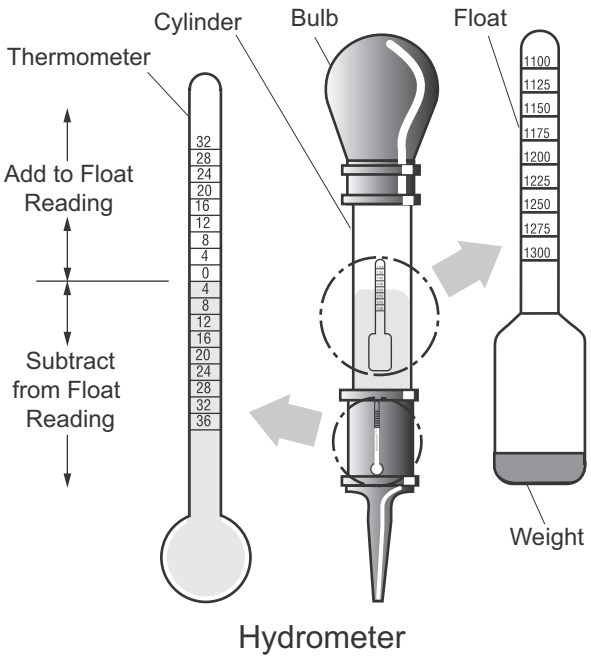
HYDROMETER

A hydrometer is used to test the state of charge of a battery cell. This is performed by measuring the density of the electrolyte, which is accomplished by measuring the specific gravity of the electrolyte. The greater the concentration of sulfuric acid, the more dense the electrolyte becomes. The higher the density, the higher the state of charge.

⚠ WARNING

To prevent battery explosion that could result in severe personal injury or death, never insert a metal thermometer into a battery. Use a hydrometer with a built in thermometer that is designed for testing batteries.

Specific gravity is the measurement of a liquid that is compared to a baseline. The baseline is water which is assigned a base number of 1.000. The concentration of sulfuric acid to water in a new battery is 1.280 which means that the electrolyte weighs 1.280 times the weight of the same volume of water. A fully charged battery will test at 1.275 - 1.280 while a discharged battery will read in the 1.140 range.



Hydrometer

NOTICE

Do not perform a hydrometer test on a battery that has just been watered. The battery must go through at least one charge and discharge cycle in order to permit the water to adequately mix with the electrolyte.

The temperature of the **electrolyte** is important since the hydrometer reading must be corrected to 80° F (27° C). High quality hydrometers are equipped with an internal thermometer that will measure the temperature of the electrolyte and will include a conversion scale to correct the float reading. It is important to recognize that the electrolyte temperature is significantly different from the ambient temperature if the vehicle has been operated.

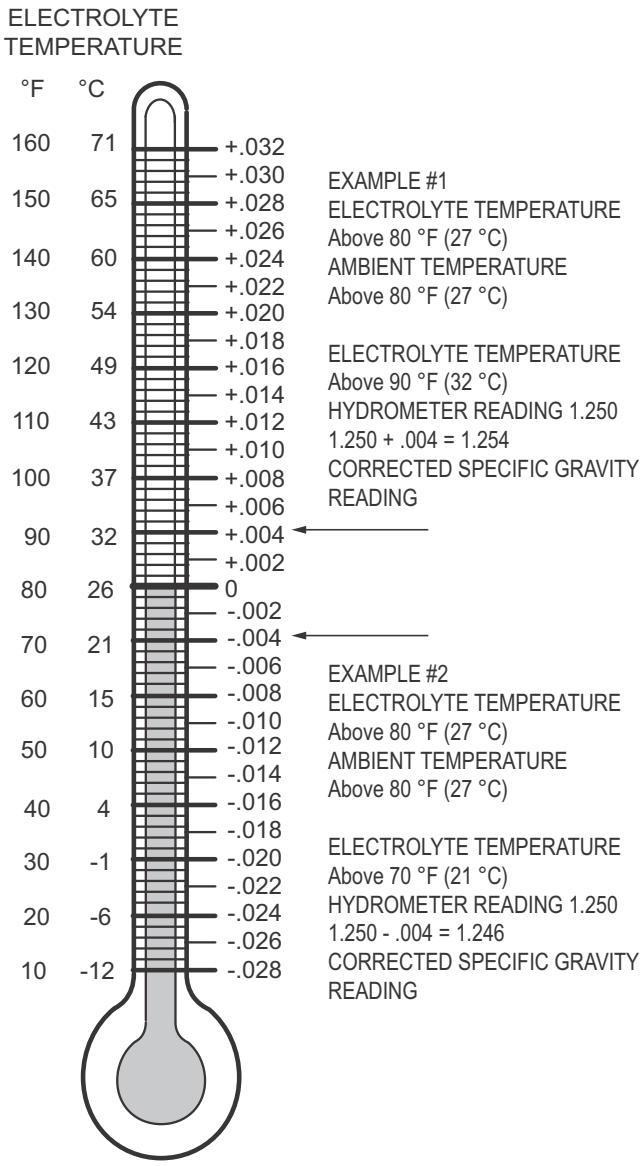
Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

Using a Hydrometer

1. Draw electrolyte into the hydrometer several times to permit the thermometer to adjust to the electrolyte temperature and note the reading. Examine the color of the electrolyte. A brown or gray coloration indicates a problem with the battery and is a sign that the battery is nearing the end of its life.
2. Draw the minimum quantity of electrolyte into the hydrometer to permit the float to float freely without contacting the top or bottom of the cylinder.
3. Hold the hydrometer in a vertical position at eye level and note the reading where the electrolyte meets the scale on the float.
4. Add or subtract four points (.004) to the reading for every 10° F (6° C) the electrolyte temperature is above or below 80° F (27° C). Adjust the reading to conform with the electrolyte temperature, e.g., if the reading indicates a specific gravity of 1.250 and the electrolyte temperature is 90° F (32° C), add four points (.004) to the 1.250 which gives a corrected reading of 1.254. Similarly if the temperature was 70° F (21° C), subtract four points (.004) from the 1.250 to give a corrected reading of 1.246.
5. Test each cell and note the readings (corrected to 80° F or 27° C). A variation of fifty points between any two cell readings (example 1.250 - 1.200) indicates a problem with the low reading cell(s).

As a battery ages the specific gravity of the electrolyte will decrease at full charge. This is not a reason to replace the battery providing all cells are within fifty points of each other.

Since the hydrometer test is in response to a vehicle exhibiting a performance problem, the vehicle should be recharged and the test repeated. If the results indicate a weak cell, the battery or batteries should be removed and replaced with a good battery of the same brand, type and approximate age.



Hydrometer Temperature Correction

PROLONGED STORAGE

Battery Set and Gas Starting Battery

During periods of storage, the batteries will need attention to keep them maintained and prevent discharge. In high temperatures the chemical reaction is faster, while low temperatures cause the chemical reaction to slow down. A vehicle that is stored at 90° F (32° C) will lose.002 of specific gravity each day. If a fully charged battery has a specific gravity of 1.275, and the battery is allowed to sit unused, it will become partially discharged. When it reaches 1.240, which it will do in less than twenty days, it should be recharged. If a battery is left in a discharged state, sulfating takes place on and within the plates. This condition is not reversible and will cause permanent damage to the battery. In order to prevent damage, the battery should be recharged. A hydrometer can be used to determine the specific gravity and therefore the state of charge of a battery.

Gas Engine

⚠ WARNING

To reduce the possibility of severe injury or death resulting from a possible explosion:

Do not handle fuel in an area that is not adequately ventilated. Do not smoke near the fuel tank or refuel near open flame or electrical items which could produce a spark.

Store vehicle in a clean, dry area. Do not store in same area as a stove, furnace, water heater, or other appliance that uses a pilot light or has a device that can create a spark.

When refueling, inspect the fuel cap for leaks or breaks that could result in fuel spillage.

Always wear safety glasses while refueling to prevent possible eye injury from gasoline or gasoline vapor.

Keep hands, clothing and jewelry away from moving parts. Use care not to contact hot objects. Raise the rear of the vehicle and support on jack stands before attempting to run the engine.

Preparing the engine for a prolonged storage period (30 days or more) calls for a few simple steps to prevent a build up of varnish and gum in the carburetor and corrosion in the engine.

- Turn the Key Switch to OFF position, and leave the Forward/Reverse switch in the NEUTRAL position during storage.
- Perform all required routine maintenance per the Periodic Service Schedule.
- Properly inflate the tires to recommended pressure (psi) stated on sidewall of tires.
- Place the Forward/Reverse handle in the NEUTRAL position engage the neutral lock, see page 5 - 11.
- Turn the fuel shut-off valve to the closed (OFF) position.
- With proper ventilation, run engine until the remaining fuel in carburetor and fuel lines is depleted and the engine stalls.
- Return the neutral lock to the OPERATE position.
- Loosen, but do not remove the carburetor drain screw. Drain any fuel remaining in bowl into an approved container and pour the fuel collected into the vehicle fuel tank. Add fuel stabilizer (per manufacturers instructions) to stabilize fuel. Install the tank cap securely.
- Tighten the carburetor drain screw.
- Remove spark plug and pour about 1/2 oz. (15 ml) of SAE 10 - 30 weight oil or Fogging oil into the cylinder. Rotate the crankshaft by hand several times, then install the spark plug.
- Do not engage the park brake, but secure the car from rolling.
- While engine is still warm, change oil.
- Clean body, chassis and engine of debris, mud, chaff or grass.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

PERIODIC SERVICE SCHEDULE

C - CHECK **C&A** - CHECK & ADJUST **CL** - CLEAN **R** - REPLACE

REMARKS	before each use DAILY	WEEKLY	20 hrs 100 miles/160 kms MONTHLY	60 hrs 300 miles/500 kms QUARTERLY	125 hrs 600miles/1000kms SEMI-ANNUAL	250 hrs 1200miles/2000 kms ANNUAL	5 YEARS	PAGE
Tires - pressure, condition of tires & rims	C	C	C	C	C	C		
Hardware - loose or missing	C	C	C	C	C	C		
Overall Vehicle Condition	C	C	C	C	C	C		
Battery Pack - state of charge, condition, loose terminals, corrosion, hold down & hardware	C	C	CL	CL	CL	CL		
Brake Pedal - smooth operation	C	C	C	C	C	C		
Brakes - check fluid level in master cylinder						C		
Brakes - aggressive stop test			C&A	C&A	C&A	C&A		
Park Brake - operation, does it hold on a hill	C	C	C&A	C&A	C&A	C&A		
Accelerator - smooth operation	C	C	C	C	C	C		
Charger / Receptacle - inspect charger connector and receptacle at each charge	C	C	C	C	C	C		
Wiring - loose connections, broken or missing insulation			C	C	C	C		
Direction Selector - attachment and mechanism			C&A	C&A	C&A	C&A		
Cooling Fan - build up of debris inside blower housing		C&A	C&A	C&A	C&A	C&A		
Engine Oil ** - oil level		C&A	C&A	C&A	C&A	C&A		
Engine Oil **& Filter - drain and change					R	R		
Engine - noise, vibration, acceleration, oil leaks			C&A	C&A	C&A	C&A		
Valves - check cold - Ref: Repair & Service Manual						C&A		
Cylinder Head & Pistons - remove carbon							CL	
Cooling Fan - build-up of foreign matter inside housing & fins			CL	CL	CL	CL		
Steering Assembly - excessive play, loose or missing hardware			C	C	C	C		
Tie Rods - excessive play, bent rods, loose or missing hardware			C	C	C	C		
Axle - fluid level, oil leakage, noise, loose or missing hardware			C	C	C	C		
Axles - drain & replace fluid							R	
Front and Rear Suspension - strut oil leakage, excessive play in hubs or kingpins, worn bushings, loose or missing hardware			C	C	C	C		
Front and Rear Wheel Alignment - unusual tire wear				C&A	C&A	C&A		

NOTE: Some maintenance items must be serviced more frequently on vehicles used under severe driving conditions.

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

REMARKS	before each use DAILY	WEEKLY	20 hrs 100 miles/160 kms MONTHLY	60 hrs 300 miles/500 kms QUARTERLY	125 hrs 600miles/1000kms SEMI-ANNUAL	250 hrs 1200miles/2000 kms ANNUAL	5 YEARS	PAGE
Throttle/Governor Linkage - operation & governed speed				C	C	C		
Air Filter Element - check & replace as necessary					C	C		
Drive Belt - cracks, frayed, excessive wear					C	C		

NOTE: Some maintenance items must be serviced more frequently on vehicles used under severe driving conditions.

CAPACITIES AND REPLACEMENT PARTS

The front and rear axles do NOT use the same oil.

Fuel must not exceed 10% ethanol.

CAPACITIES	
Fuel Tank / Fuel	5.3 gal (20 liters) / 87 Octane Min.
Engine Oil	52.4 oz. synthetic oil 10W40
Front Axle Oil	14 oz. 80W90 GL-5 wt. gear oil
Rear Axle Oil	22 oz. API GL-4, SAE 80 wt. gear oil
Brake Fluid	DOT 3

Oil Filter	See Engine Operator's Manual
Air Filter	See Engine Operator's Manual
Spark Plug	See Engine Operator's Manual
Headlight Bulb	p/n 619101

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

HARDWARE

Periodically, the vehicle should be inspected for loose fasteners. Use care when tightening fasteners, refer to the Technician's Repair and Service Manual for specific torque values.

Generally, three classes of standard hardware and two classes of metric hardware are used in the vehicle. Grade 5 hardware can be identified by the three marks on the hex head and grade 8 hardware is identified by six marks on the head. metric hardware is marked on the head with 8.8 or 10.9. Unmarked hardware is Grade 2.

ALL TORQUE FIGURES ARE IN FT. LBS. (Nm)

Unless otherwise noted in text, tighten all hardware in accordance with this chart.
This chart specifies 'lubricated' torque figures. Fasteners that are plated or lubricated when installed are considered 'wet' and require approximately 80% of the torque required for 'dry' fasteners.

BOLT SIZE	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	3/4"	7/8"	1"
Grade 2	4 (5)	8 (11)	15 (20)	24 (33)	35 (47)	55 (75)	75 (102)	130 (176)	125 (169)	190 (258)
Grade 5	6 (8)	13 (18)	23 (31)	35 (47)	55 (75)	80 (108)	110 (149)	200 (271)	320 (434)	480 (651)
Grade 8	6 (8)	18 (24)	35 (47)	55 (75)	80 (108)	110 (149)	170 (230)	280 (380)	460 (624)	680 (922)
BOLT SIZE	M4	M5	M6	M8	M10	M12	M14			
Class 5.8 (Grade 2)	1 (2)	2 (3)	4 (6)	10 (14)	20 (27)	35 (47)	55 (76.4)			
Class 8.8 (Grade 5)	2 (3)	4 (6)	7 (10)	18 (24)	35 (47)	61 (83)	97 (131)			
Class 10.9 (Grade 8)	3 (4)	6 (8)	10 (14)	25 (34)	49 (66)	86 (117)	136 (184)			

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

Notes:

APPENDIX A

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

TTITLE **PAGE NO.**

DELTA Q BATTERY CHARGER ..... A - 2

APPENDIX A

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

QuiQ™ HF/PFC Battery Charger

User's Guide for:
912-2400, 912-3600-07, 912-4800-14

delta-q TECHNOLOGIES

SAVE THESE IMPORTANT SAFETY INSTRUCTIONS

This manual contains important safety, operating, and installation instructions – read before using charger.

Battery Safety Information

Warning: Use charger only on battery systems with an algorithm selected that is appropriate to the specific battery type. Other usage may cause personal injury and damage. Lead acid batteries may generate explosive hydrogen gas during normal operation. Keep sparks, flames, and smoking materials away from batteries. Provide adequate ventilation during charging. Never charge a frozen battery. Study all battery manufacturers' specific precautions such as recommended rates of charge and removing or not removing cell caps while charging.

Electrical Safety Information

Danger: Risk of electric shock. Connect charger power cord to an outlet that has been properly installed and grounded in accordance with all local codes and ordinances. A grounded outlet is required to reduce risk of electric shock – do not use ground adapters or modify plug. Do not touch uninsulated portion of output connector or uninsulated battery terminal. Disconnect the AC supply before making or breaking the connections to the battery while charging. Do not open or disassemble charger. Do not operate charger if the AC supply cord is damaged or if the charger has received a sharp blow, been dropped, or otherwise damaged in any way – refer all repair work to qualified personnel. Not for use by children.

INFORMATIONS IMPORTANTES DE SÉCURITÉ

Conserver ces instructions. Ce manuel contient des instructions importantes concernant la sécurité et le fonctionnement.

Information de Sécurité de la Batterie

Attention: Utiliser seulement sur les systèmes batteries avec un algorithme approprié au type spécifique de batterie. D´autres types de batteries pourraient éclater et causer des blessures ou dommages. Les batteries peuvent produire des gaz explosives en service normal. Ne jamais fumer près de la batterie et éviter toute étincelle ou flame nue à proximité de ces derniers. Fournisser la bonne ventilation lors du chargement. Ne jamais charger une batterie gelée. Prendre connaissance des mesures de précaution spécifiées par le fabricant de la batterie, p. ex., vérifier s´il faut enlever les bouchons des cellules lors du chargement de la batterie, et les taux de chargement recommandés.

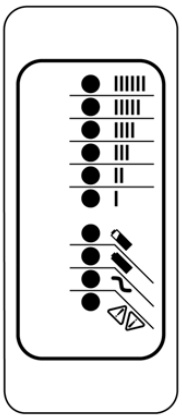
Information de Sécurité Électrique

Danger: Risque de chocs électriques. Ne pas toucher les parties non isolées du connecteur de sortie ou les bornes non isolées de la batterie. Toujours connecter le chargeur à une prise de courant mise à la terre. Ne pas ouvrir ni desassembler le chargeur – referer toute reparations aux personnes qualifiés. Pas à l´usage des enfants.

Operating Instructions

CAUTION: Charger enclosure may be hot during charging. Use hand protection if handling the charger while charging.

1. Extension cords must be 3-wire cord no longer than 30m(100') at 10AWG or 7.5m(25') at 16AWG per UL guidelines.
2. Only connect **ONE** QuiQ charger to a single 15A circuit or the circuit may become overloaded.
3. Charger 10-LED Display



LED indications following "Power-On Self Test" flashes:

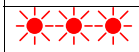
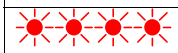
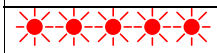
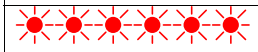
Ammeter (Amber)	**Solid:**	Displays approximate scale of current output during charging.
	Flashing:	High internal temperature, current output reduced. Also displays algorithm #1-6 for 11 seconds if no battery is connected.
80% Charge (Amber)	**Solid:**	Bulk charge phase complete, 80% charged. In Absorption phase.
	Flashing:	With no battery connected, indicates algorithm # selected by number of flashes.
100% Charge (Green)	**Solid:**	Charging complete. Charger in Maintenance Mode.
	Flashing:	Absorption phase complete. In Finish phase
AC On (Amber)	**Solid:**	AC Power good
	Flashing:	Low AC Voltage, check voltage and extension cord length (see above for guidelines).
Fault (Red)	**Flashing:**	Charger error. Reset charger power and refer to Troubleshooting below.

Maintenance Instructions

1. Do not expose charger to oil, dirt, mud or direct heavy water spray when cleaning vehicle.
2. The enclosure of the charger has been tested successfully to EN60529, meeting IP66. The AC supply inlet is rated to IP20, which is suitable for indoor use only. Keep all AC connections clean and dry.

Troubleshooting Instructions

If a fault occurs, count the number of red flashes between pauses and refer to the table below:

Red Flashes	Cause	Solution
	Charge Enable Fault or	Check connector contacts and retry.
	Battery Temperature Fault	Check that battery temperature is between -10°C and +50°C.
	Battery Voltage Too Low or High	Check battery size and condition of batteries.
	Charge Timeout caused by battery pack not reaching required voltage.	Check for loose connections or corrosion.
	Charger output was reduced due to high temperatures.	Operate charger at a lower ambient temperature or increase cooling air flow.
	Check Battery: battery could not be trickle charged up to minimum voltage	Check for shorted or damaged cells.
	Over-Temperature: Charger shut down due to high internal temperature.	Ensure sufficient cooling air flow and reset charger (interrupt AC power for 15 seconds).
	Charger Internal Fault	Reset charger (interrupt AC power for 15 seconds). Return to qualified service depot if fault persists.

Specifications

DC Output – see Operating Instructions

QuiQ Model:	912-2400 628089	912-3600-07 628102	912-4800-14 624206
Voltage-nom (V)	24	36	48
Voltage-max (V)	34	51	67
Current-max (A)	25	21	18
Battery Type	Lead acid (Wet / AGM / GEL)		
Reverse Polarity	Electronic protection – auto-reset		
Short Circuit	Electronic current limit		

AC Input

All models	
Voltage-max (Vrms)	85 – 265
Frequency (Hz)	45 - 65
Current - max (Arms)	9.5A @ 120VAC 5A @ 230VAC
AC Power Factor	>0.99 at 120VAC >0.98 at 230VAC

Mechanical

All models	
Dimensions	28.0 x 24.5 x 11.0 cm (11 x 9.7 x 4.3")
Weight	<5 kg (11 lbs)
Environmental	Enclosure: IP66
Operating Temperature	-30°C to +50°C (-22°F to 122°F), derated above 30°C, below 0°C
Storage Temperature	-40°C to +70°C (-40°F to 158°F)
AC input connector	IEC320/C14 (require ≥1.8m localized cord)
DC output	OEM specific w/ 12AWG wire

Operation

All models	w/Default Algo 1
Battery Temperature Compensation	Automatic
Maintenance Mode	Auto-restart if V < 2.08V/cell or 30 days elapse

Regulatory

Safety	
EN 60335-2-29	Safety of Appliances/ Battery Chargers
UL2202 (1st Ed.)	EV Charging System Equipment
UL1564 3rd Ed.	Industrial Battery Charger
CSA- 107.2	Battery Chargers- Industrial
Emissions	
FCC Part 15/ICES 003	Unintentional Radiators Class A
EN 55011	Radio disturbance characteristics (Class A)
EN 61000-3-2	Limits for harmonic current emissions
EN 61000-3-3	Limits of voltage fluctuations and flicker
Immunity	
EN 61000-4-2	Electrostatic discharge immunity
EN 61000-4-3	Radiated, radio-frequency, EMF immunity
EN 61000-4-4	Electrical fast transient/burst immunity
EN 61000-4-5	Surge immunity
EN 61000-4-6	Conducted Immunity
EN 61000-4-11	Voltage variations immunity

Product warranty is dependent on model - please contact dealer of original equipment for warranty service.

Note: This is a Class A product. In a domestic environment this product may cause radio interference, and the user may be required to take adequate measures.

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Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

Notes:

APPENDIX B

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

SUBARU ENGINE OPERATOR'S MANUAL

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Components 4
Pre-operation Checks 5
Battery Installation 7
Operating Your Engine 9
Easy Troubleshooting 11
Spark Arrestor (Optional) 13
Maintenance Schedule 14
"How-To" Maintenance 16
Preparations for Storage 20
Specifications 21

The Subaru Owner's Manual (2ZZ9990168 issue EMD-EU6943) is included in this manual (without changes or editing) with the permission of Subaru Industrial Power Products. Copying or reprinting of this manual is prohibited.

APPENDIX B

Read all of this manual to become thoroughly familiar with this vehicle. Pay particular attention to all Notices, Cautions, Warnings, and Dangers.

Notes:

SUBARU

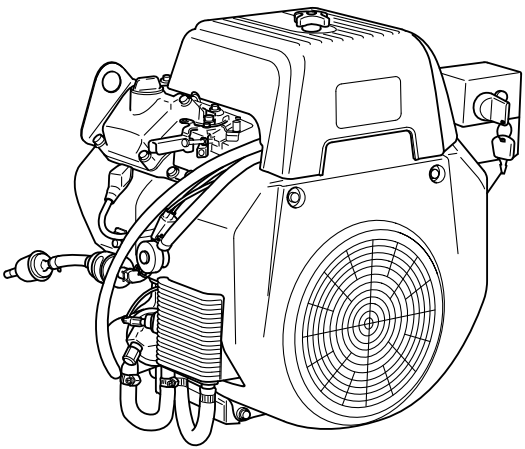
Industrial Power Products

EH72 FI

US *INSTRUCTIONS FOR USE*

FR *MANUEL D'UTILISATION*

ES *MANUAL DE INSTRUCCIONES*



2ZZ9990168

(英・仏・西)

OHV Gasoline Engines

(California Proposition 65)

⚠ WARNING: ⚠

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

(California only)

AIR INDEX

To show compliance with California emission regulations, a hangtag has been provided displaying the Air Index level and durability period of this engine.

The Air Index level defines how clean an engine's exhaust is over a period of time. A bar graph scaled from "0" (most clean) to "10" (least clean) is used to show an engine's Air Index level. A lower Air Index level represents cleaner exhaust from an engine.

The period of time (in hours) that the Air Index level is measured is known as the durability period. Depending on the size of the engine, a selection of time periods can be used to measure the Air Index level (see below).

Descriptive Term		Applicable to Emissions Durability Period
Moderate	-	50 hours (engine from 0 to 80 cc)
		125 hours (engine greater than 80 cc)
Intermediate	-	125 hours (engine from 0 to 80 cc)
		250 hours (engine greater than 80 cc)
Extended	-	300 hours (engine from 0 to 80 cc)
		500 hours (engine greater than 80 cc)
		1000 hours (225 cc and greater)

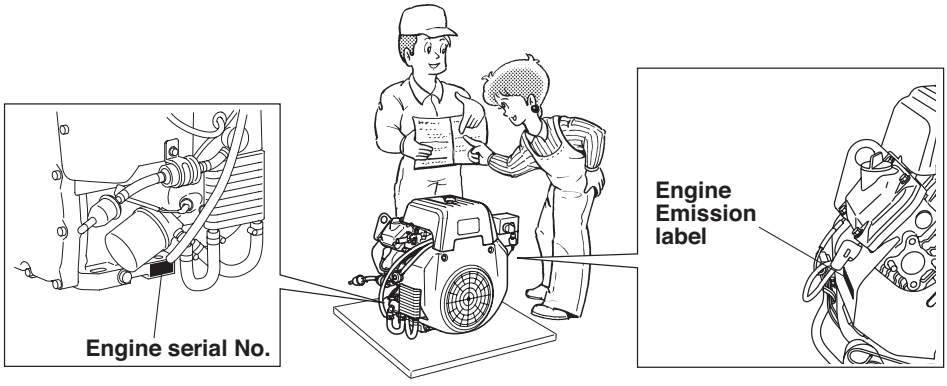
Notice : This hangtag must remain on this engine or piece of equipment, and only be removed by the ultimate purchaser before operation.

Notice : FEDERAL EMISSION COMPONENT DEFECT WARRANTY and CALIFORNIA EMISSION CONTROL WARRANTY are applicable to only those engines/ generators complied with EPA (Environmental Protection Agency) and CARB (California Air Resources Board) emission regulations in the U.S.A.

Notice : To the engines/generators exported to and used in the countries other than the U.S.A., warranty service shall be performed by the distributor in each country in accordance with the standard Robin engine/generator warranty policy as applicable.

FOREWORD

Thank you very much for purchasing a **ROBIN ENGINE**.



Your ROBIN ENGINE can supply the power to operate various sorts of machines and equipment.
Please take a moment to familiarize yourself with the proper operation and maintenance procedures in order to maximize the safe and efficient use of this product.
Due to constant efforts to improve our products, certain procedures and specifications are subjected to change without notice.
When ordering spare parts, always give us the MODEL, SPECIFICATION and SERIAL NUMBER of your engine.
Please fill in the following blanks after checking the specification number on your engine.

SPEC NO. | E | H | | | | | | | | | | | |

SERIAL NO. | | | | | | | |

For your nearest ROBIN distributor (and/or dealer), you are able to check at our ROBIN website of the following URL;

http://www.subaru-robin.jp

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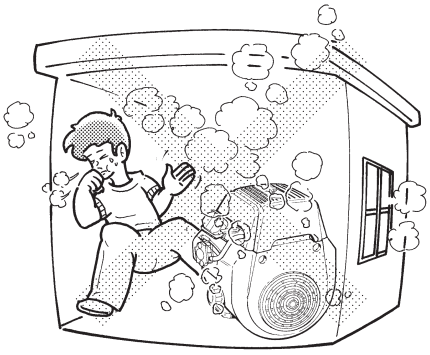
SYMBOLS

	Read manual.		*Shutt off fuel valve when the engine is not in use.*
	Stay clear of the hot surface.		*Check for leakage from hose and fittings.*
	Exhaust gas is poisonous. Do not operate in an unventilated room or enclosed area.		*Fire, open flame and smoking prohibited.*
	Stop the engine before refueling.		*HOT, avoid touching the hot area.*

	On (Run)		*Engine start (Electric start)*		*Fuel (gasoline)*
	Off (Stop)		*Engine stop*		*Fuel (diesel)*
	Engine oil		*Cold engine*		*Fuel shut-off*
	Add oil		*Warm engine*		*Fuel system failure / malfunction*
	Battery		*Electrical preheat (Low tem-perature start aid)*		*Choke*
	Fast		*Run position*		*Plus ; positive polarity*
	Slow		*Stop position*		*Minus ; negative polarity*
	Primer		*Push primer*		*Do not push primer*
2X	*Two times*				

1. SAFETY PRECAUTIONS

Please make sure you review each precaution carefully.



EXHAUST PRECAUTIONS

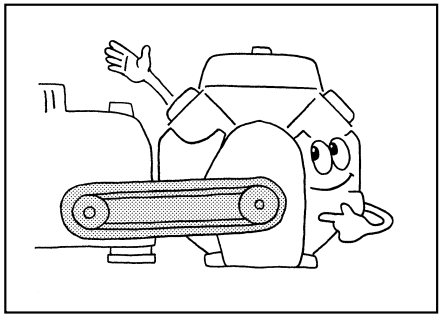
- Never inhale exhaust gas. It contains carbon monoxide, a colorless, odorless and extremely dangerous gas which can cause unconsciousness or death.
- Never operate the engine indoors or in a poorly ventilated area, such as tunnel, cave, etc.
- Exercise extreme care when operating the engine near people or animals.
- Keep the exhaust pipe free of foreign objects.

REFUELING PRECAUTIONS

- Be sure to stop the engine prior to refueling.
- Do not overfill the fuel tank.
- If fuel is spilt, wipe it away carefully and wait until the fuel has dried before starting the engine.
- After refueling, make sure that the fuel cap is secured to prevent spillage.

FIRE PREVENTION

- Do not operate while smoking or near an open flame.
- Do not use around dry brush, twigs, cloth rags, or other flammable materials.
- Keep the engine at least 3 feet (1 meter) away from buildings or other structures.
- Keep the engine away from flammables and other hazardous materials (trash, rags, lubricants, explosives).



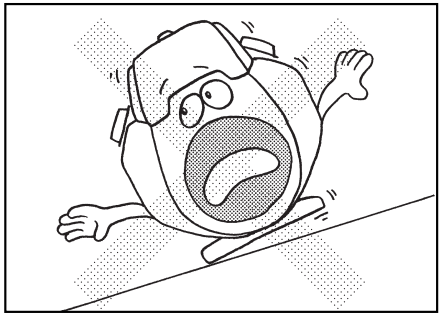
PROTECTIVE COVER

■ **Place the protective covers over the rotating parts.**
If rotating parts such as the drive shaft, pulley, belt, etc. are left exposed, they are potentially hazardous.
To prevent injury, equip them with protective covers or shrouds.

■ **Be careful of hot parts**.
The muffler and other engine parts become very hot while the engine is running or just after it has stopped. Operate the engine in a safe area and keep children away from the running engine.

■ Never make adjustments on the machinery while it is connected to the engine, without first removing the ignition cable from the spark plug. Turning the crankshaft by hand during adjusting or cleaning might start the engine, and the machinery with it, causing serious injury to the operator.

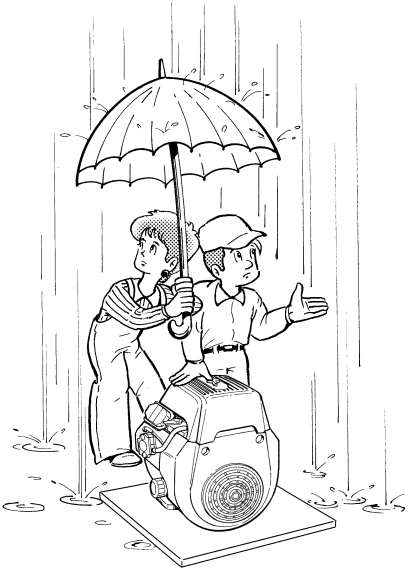
■ Never run the engine with governor disconnected, or operate at speeds in excess of 3600 rpm load.



SURROUNDINGS

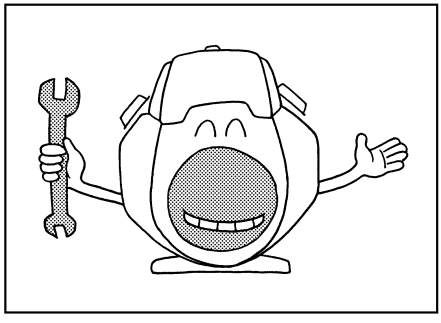
■ Operate the engine on a stable, level surface free of small rocks, loose gravel, etc.

NOTE
Operating the engine at a steep incline may cause seizure due to improper lubrication even with a maximum oil level.



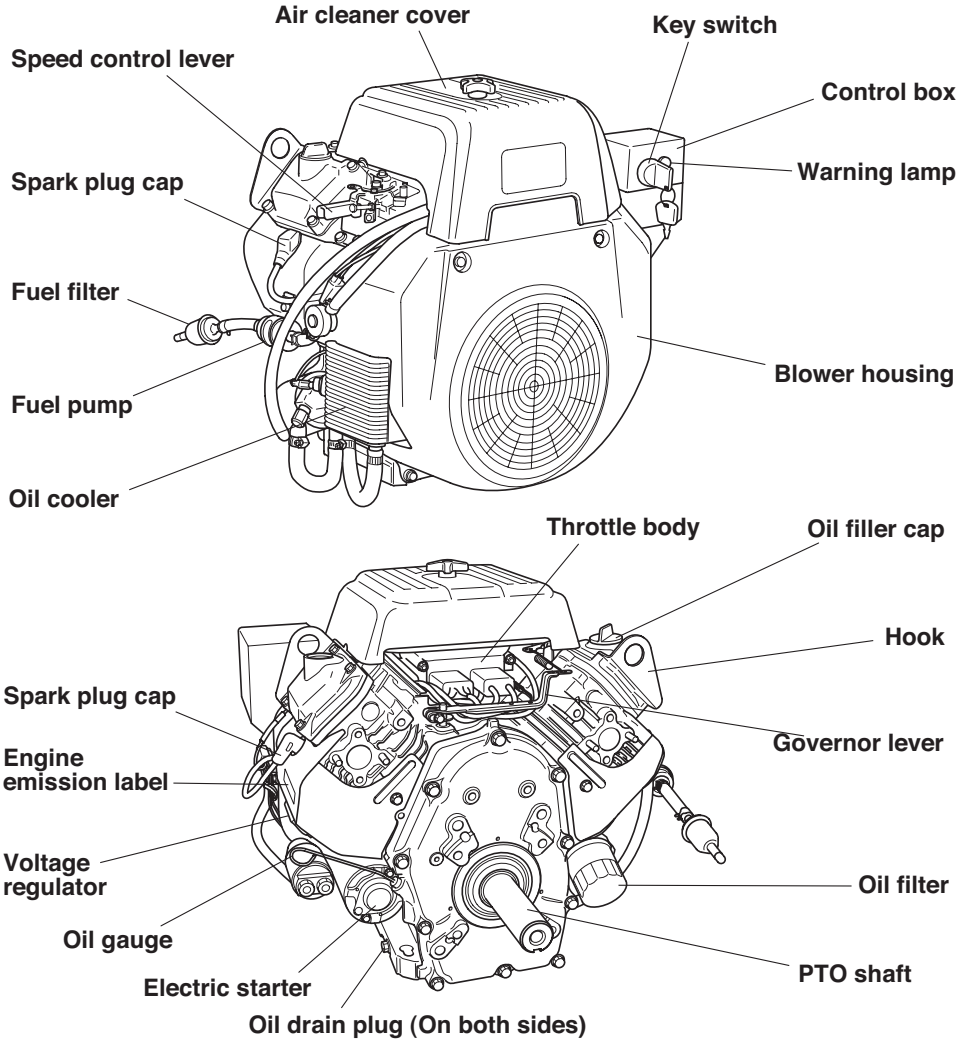
- **Drain the fuel when transporting the engine.**
- **Do not move the engine while in operation when it has been removed from the equipment.**
- Keep the unit dry (do not operate it in rainy conditions).

PRE-OPERATION CHECKS.



- Carefully check fuel hoses and connections for looseness and fuel leakage. Leaking fuel creates a potentially dangerous situation.
- Check bolts and nuts for looseness. A loose bolt or nut may cause serious engine trouble.
- Check the engine oil daily and refill if necessary.
- Check the fuel level and refill if necessary.
  Do not overfill the tank.
- Wear snug fitting working clothes when operating the engine.
  Loose aprons, towels, belt, etc., may be caught in the engine or drive train, causing a dangerous situation.

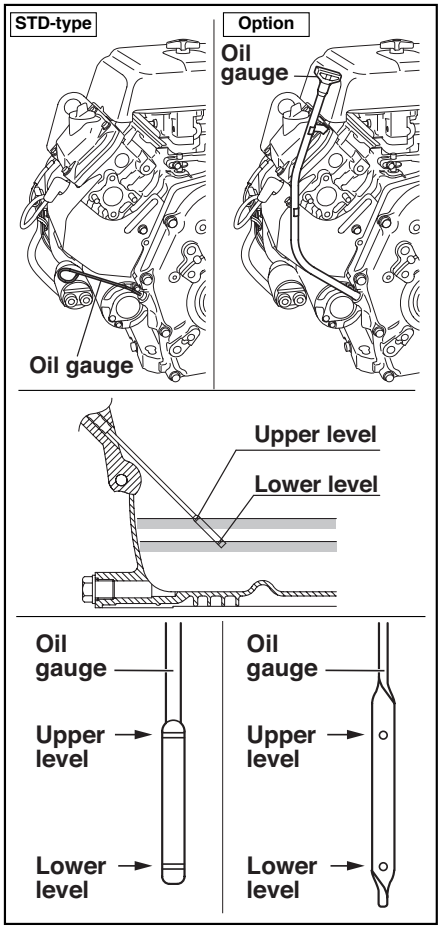
2. COMPONENTS

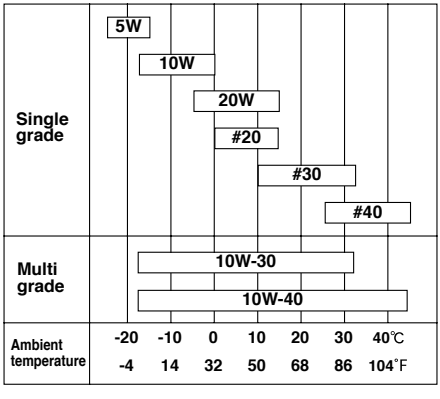


REMARKS :

- Fuel tank, valve (sediment bowl type is recommended), fuel hoses, and fuel filter are required for connecting fuel source to throttle body.
- A battery rated at 12V-36AH or larger with the specified cable are required for electric starter operation. Make the proper electrical wiring arrangements before normal engine operation.
  (See Section 4 Battery Installation for instructions.)

3. PRE-OPERATION CHECKS





CHECK ENGINE OIL (DAILY)

Before checking or refilling engine oil, be sure the engine is not running and is located on a stable, level surface.

■ If the oil level is below the lower level line on the oil gauge, refill with the proper oil (see table) to the upper level.
OIL CAPACITY : 1.55 liter

■ When filling oil in the engine, keep the engine level and fill the oil up to the upper mark of the oil gauge. Measure the oil level with the oil gauge plugged in position.

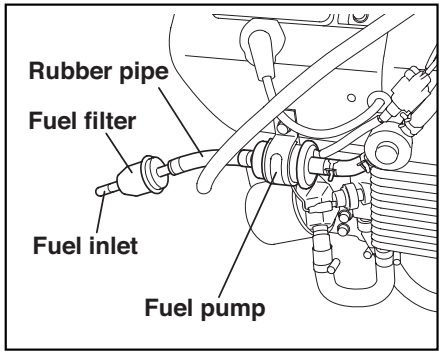
■ After an oil change, run the engine, and recheck the oil level. The oil level may drop a little as the oil fills the oil filter. Fill the oil up to the upper mark of the oil gauge.

■ Change oil if it is contaminated. (See Section 8 Maintenance Schedule.)

■ Use 4-stroke automotive detergent oil of API service class SE or higher grade (SG, SH or SJ is recommended).

■ If multi-grade oil is used, oil consumption tends to increase when the ambient temperature is high.

CHECK FUEL



⚠ WARNING

Do not refuel while smoking, near an open flame or other potential hazards.

NOTE :
THIS ENGINE IS CERTIFIED TO OPERATE ON AUTOMOTIVE UNLEADED GASOLINE.

■ The fuel tank shall be provided separately, because the engine is not equipped with a fuel tank.

A fuel valve and fuel filter should be connected between the fuel tank and fuel pump.

Securely connect with fuel hoses to the fuel pump to prevent leakage.

■ Fuel tanks may be mounted up to 0.66 meters (2 feet) below the throttle body.

If the fuel tank is mounted above the throttle body, a fuel shut off valve must be connected between the fuel tank and fuel pump. The fuel valve must be shut off when the engine is not operating to prevent fuel from flooding the throttle body.

■ A serious accident may occur if the fuel hose comes off. Properly secure the fuel line connections by completely inserting the hose onto the fittings and securing the connection with a hose clamp.

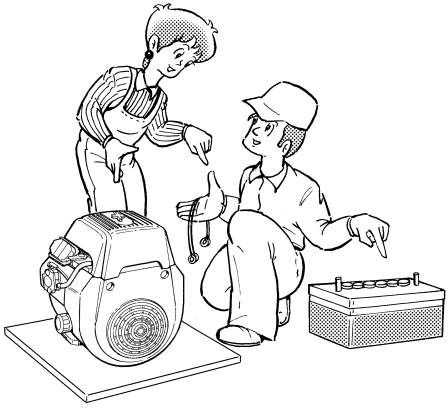
■ Use automotive unleaded gasoline only.

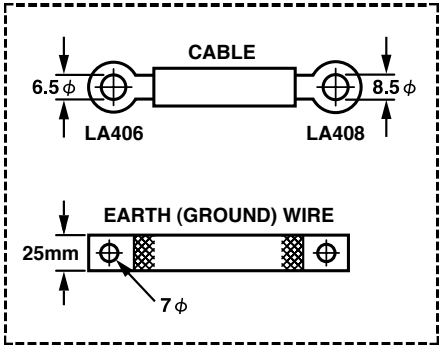
■ Stop the engine and close the fuel valve before filling the fuel tank.

■ Wipe off any spilled fuel before starting the engine.

4. BATTERY INSTALLATION

For electric starter operation, proper electric wiring arrangements are needed before normal engine operation.





PARTS NEEDED

- Use a battery rated 12V-36AH or larger.
- Use a proper cable and ground wire to connect battery and key switch and electric starter.

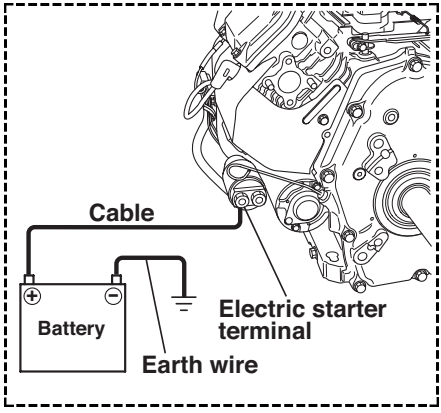
BATTERY CABLE

CABLE LENGTH	CABLE DIA.	WIRE GAUGE		
		AWG (BS) BWG	SAE	JIS
Less than 1.5 m	7.3 mm	1	6	AV15
1.5 m to 2.5 m	8.5 mm	0	4	AV20
2.5 m to 4.0 m	10.8 mm	3/0	2	AV30

GROUND WIRE, use a flat braided wire of 0.03 sq. in. or larger sectional area. (SAE GAUGE 4)

KEY SWITCH CABLE

CABLE LENGTH	CABLE DIA.	WIRE GAUGE		
		AWG (BS)	BWG	JIS
Less than 1.5 m	1.5 mm	14	16	AV1.25
1.5 m to 3.0 m	1.9 mm	12	14	AV2
3.0 m to 5.0 m	2.4 mm	10	13	AV3



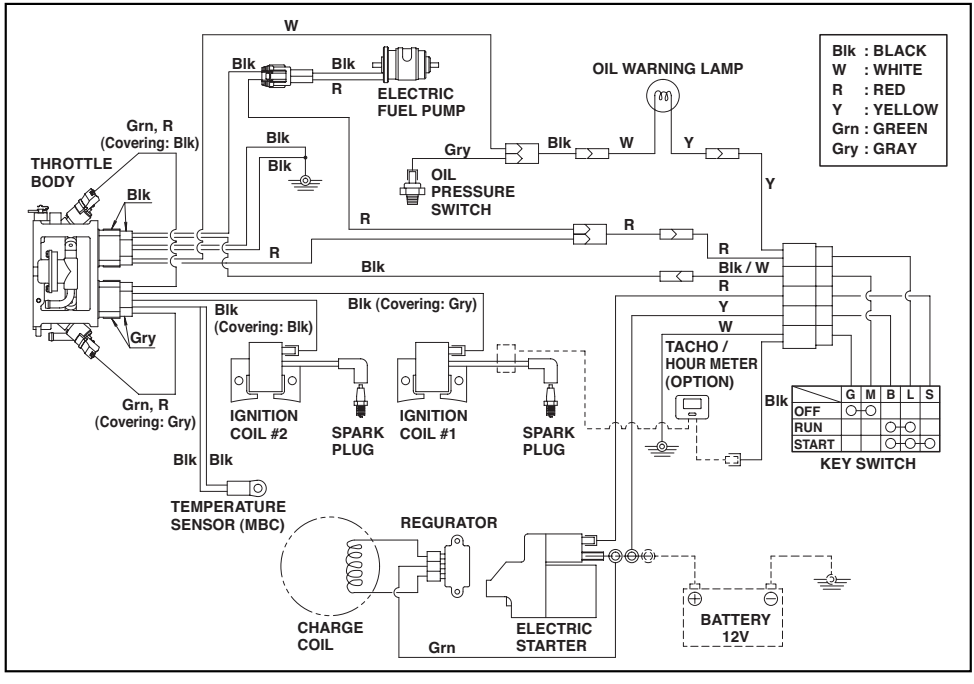
WIRING

- **Connect positive terminal of electric starter and positive terminal of the battery with battery cable.**
- **Ground negative terminal of the battery to the body of engine or machine with ground wire.**

NOTE

Tighten bolts and nuts on terminals securely so they will not be loosened by vibration.

WIRING DIAGRAM



Optional hardware shown by dotted lines. Select wires of proper gauge and connect battery as shown by the dotted line in the wiring diagram.

5. OPERATING YOUR ENGINE

NOTE
Following operating method is for the STD type speed control lever. As to the fixed type speed control lever (exp. Generator spec.), do not move it otherwise the generator component such as voltage regulator may be damaged.

STARTING

FUEL VALVE

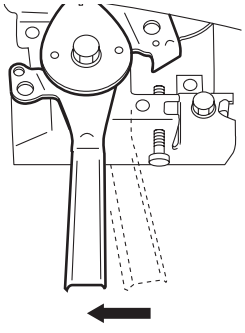
1

(Provided by the equipment manufacturer)

Open the fuel valve.

SPEED CONTROL LEVER

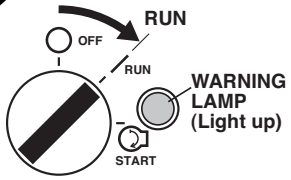
2



Set the speed control lever 1/3 of the way towards the high speed position.

ELECTRIC STARTER

3

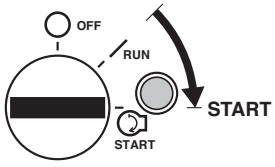


If there is a control box mounted, turn the key switch and set it to the "RUN" position. Check to make sure that the warning and other lights illuminate (red).

- When the key switch is set to the drive position (RUN) the operating noise of the fuel pump may be audible for two or three seconds (this is not a malfunction).

ELECTRIC STARTER

4

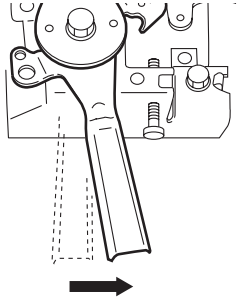


Turn the key switch to the "START" position.

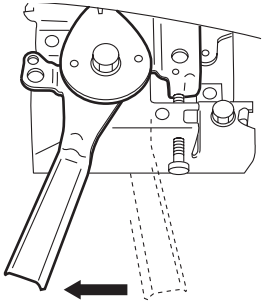
- Do not operate the electric starter continuously for more than 5 seconds, even if the engine dose not start.
- If the engine failed to start, set the key to the "RUN" position and wait for about 10 seconds before retrying.
- Never turn the key switch to the "START" position while engine is running.

RUNNING

SPEED CONTROL LEVER



After the engine starts, set the speed control lever at the low speed position and warm it up without load for a few minutes.



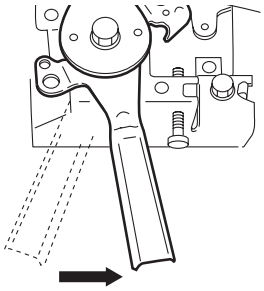
Gradually move the speed control lever toward the high speed position and set it at the required engine speed.

NOTE :
Whenever high speed operation is not required, slow the engine down (idle) by moving the speed control lever to save fuel and extend engine life.

STOPPING

SPEED CONTROL LEVER

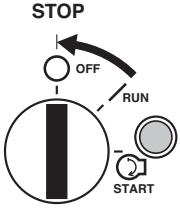
1



Set the speed control lever at the low speed position and allow the engine to run at low speed for 2 or 3 minutes before stopping.

ELECTRIC STARTER

2



Turn the key switch to the "STOP" position.

FUEL VALVE

3

Close the fuel valve.

6. EASY TROUBLESHOOTING

WHEN ENGINE WILL NOT START:

■ Perform the following checks before you take the engine to your Robin dealer.

■ If you still have trouble after completing the checks, take the engine to your nearest Robin dealer.

Is there enough compression?

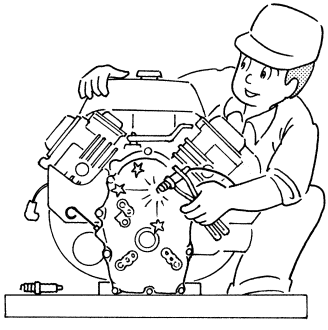
If the spark plug is loose, tighten it.

Is the spark plug wet with gasoline?

1. Slowly start the engine for 2 or 3 seconds.
   Remove the plug and check if its electrode is wet. If the electrode is wet, fuel is well supplied to your engine.
2. When the electrode is dry, check to find where the fuel is restricted.
   (Check the fuel intake of the throttle body and fuel strainer intake.)
3. In case the engine does not start with well supplied fuel, try using fresh fuel.

⚠ WARNING

Wipe off spilled fuel carefully before checking the spark plug.
Place spark plug as far away from spark plug hole as possible.
Do not hold spark plug by hand while checking.



Is there a strong spark across the electrode?

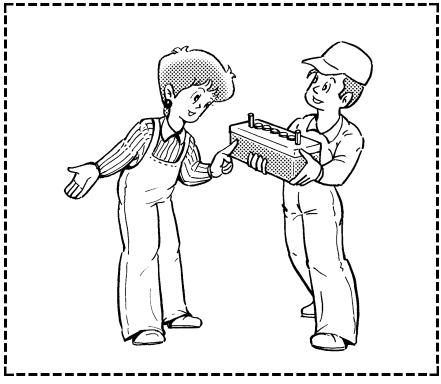
1. Remove the spark plug and connect it to the plug cap.

   Turn key switch to START position while grounding spark plug against engine body.
2. Try with a new spark plug if the spark is weak or there is no spark.
3. The ignition system is faulty if there is no spark with a new spark plug.
   Take your engine to your nearest Robin dealer.

About the Warning Lamp

■ Check the oil if the warning lamp illuminates while driving.
(Refer to Section "3. PRE-OPERATION CHECKS" for instructions.)

■ Have the vehicle inspected at a dealer or maintenance shop if the warning light is flashing while driving.



Is your battery well charged ?

Check the battery, it may be discharged and unable to operate the electric starter.

Consult your nearest dealer or service shop.

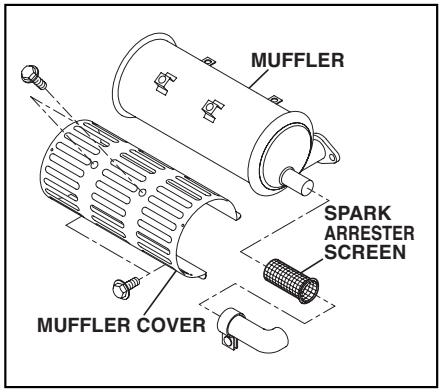
7. SPARK ARRESTER (OPTIONAL)

In a dry or wooded area, it is recommendable to use the product with a spark arrester. Some areas require the use of a spark arrester. Please check your local laws and regulations before operating your product.

The spark arrester must be cleaned regularly to keep it functioning as designed. A clogged spark arrester :

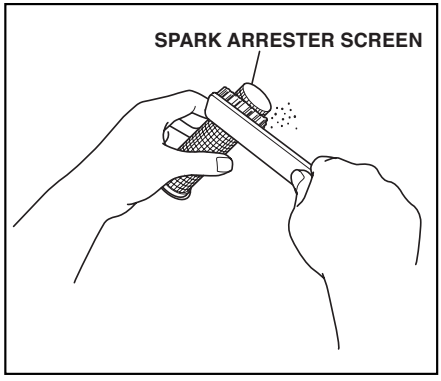
- Prevents the flow of exhaust gas
- Reduces engine output
- Increases fuel consumption
- Makes starting difficult

If the engine has been running, the muffler and the spark arrester will be very hot. Allow the muffler to cool before cleaning the spark arrester.



How to remove the spark arrester

1. Remove the flange bolts from the muffler cover and remove the muffler cover.
2. Remove the special screw from the spark arrester and remove the spark arrester from the muffler.



Clean the spark arrester screen

Use a brush to remove carbon deposits from the spark arrester screen.
Be careful to avoid damaging the screen.

The spark arrester must be free of breaks and holes. Replace the spark arrester if it is damaged.

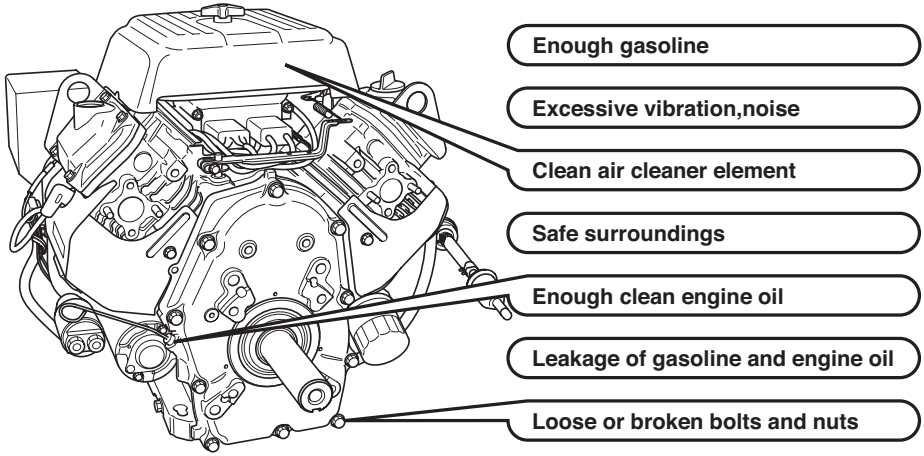
Install the spark arrester, and muffler protector in the reverse order of disassembly.

8. MAINTENANCE SCHEDULE

MAINTENANCE, REPLACEMENT, OR REPAIR OF EMISSION CONTROL DEVICES AND SYSTEMS MAY BE PERFORMED BY ANY NONROAD ENGINE REPAIR ESTABLISHMENT OR INDIVIDUAL.

DAILY INSPECTION

Before running the engine, check the following service items.



PERIODIC MAINTENANCE

Periodic maintenance is vital to safe and efficient operation of your engine. Check the table below for periodic maintenance intervals.

IT IS ALSO NECESSARY FOR THE USER OF THIS ENGINE TO CONDUCT THE MAINTENANCE AND ADJUSTMENTS ON THE EMISSION-RELATED PARTS LISTED BELOW TO KEEP THE EMISSION CONTROL SYSTEM EFFECTIVE.

The emission control system consists of the following parts:

(1) Throttle body and internal parts
(2) Cold start enrichment system, if applicable
(3) Intake manifold, if applicable
(4) Air cleaner elements
(5) Spark plug
(6) Magneto or electronic ignition system
(7) Spark advance/retard system, if applicable
(8) Exhaust manifold, if applicable
(9) Hoses, belts, connectors, and assemblies

The maintenance schedule indicated in the following table is based on the normal engine operation. Should the engine be operated in extremely dusty condition or in heavier loading condition, the maintenance intervals must be shortened depending on the contamination of oil, clogging of filter elements, wear of parts, and so on.

Periodic Maintenance Schedule table

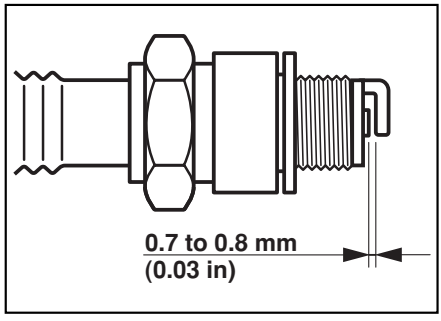
Maintenance Items	Every 8 hours (Daily)	Every 50 hours	Every 200 hours	Every 500 hours	Every 1000 hours
Clean engine and check bolts and nuts	● (Daily)				
Check and refill engine oil	● (Refill daily to upper level)				
Change engine oil (*Note 1)	● (Initial 20 hours)	● (Every 100 hours)			
Replace engine oil filter (*Note 1)	● (Initial 20 hours)		●		
Check battery electrolyte fluid level		●			
Clean spark plug		●			
Clean air cleaner		●			
Spark arrester (optional part)		● (Every 100 hours)			
Replace air cleaner element			●		
Clean fuel strainer			●		
Clean and adjust spark plug and electrodes			●		
Replace spark plug				●	
Remove carbon from cylinder head				●	
Clean throttle body (*Note 2)				●	
Clean engine base (oil pan)				●	
Check and adjust valve clearance				●	
Replace fuel lines					● (Yearly)
Overhaul engine (*Note 2)					●

*Note 1 : Initial oil change and oil filter replacement should be performed after 20 hours of operation.
Thereafter change oil every hundred (100) hours and replace oil filter 200 hours.
Before changing oil, check for a suitable way to dispose of old oil. Do not pour it down into sewage drains, onto garden soil or into open streams. Your local zoning or environmental regulations will give you more detailed instructions on proper disposal.

*Note 2 : As to the procedures, please refer to the Service Manual or consult your nearest ROBIN service dealer.

*Note 3 : More frequent oil changing, oil filter replacement and air cleaner service on replacement may be necessary depending on operating conditions.
This would include dusty environment, high ambient temperature, heavy engine loading.

9. "HOW-TO" MAINTENANCE

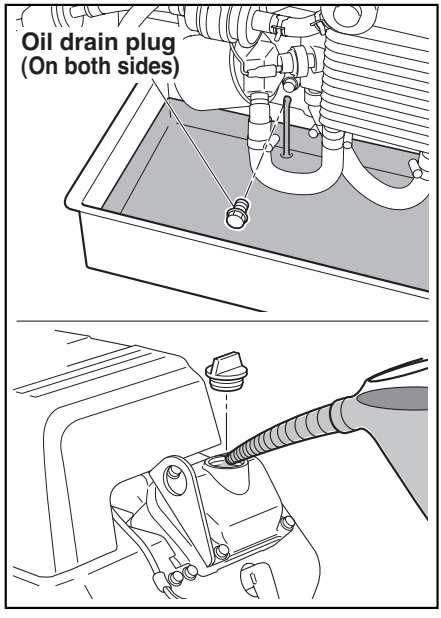


INSPECTING THE SPARK PLUG

■ Clean off carbon deposits on the spark plug electrode using a plug cleaner or wire brush.

■ Check electrode gap.
Adjust gap to :
0.7mm to 0.8mm (0.03 inches)

■ Use a proper spark plug :
BPR5ES (NGK) or BPR4EY (NGK)



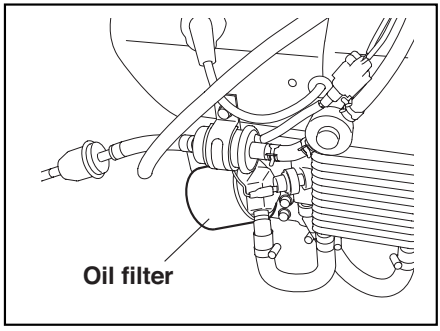
ENGINE OIL CHANGE

■ Initial oil change
・・・・・After 20 hours of operation

■ Thereafter
・・・・・Every 100 hours of operation

1. When changing oil, stop the engine and loosen the drain plug.
2. Re-install the drain plug before refilling oil.
3. Refer to the recommended oil table. (See Section 3 Pre-operation Checks)
4. Always use the best grade and clean oil. Contaminated oil, poor quality oil and shortage of oil cause damage to engine or shorten the engine life.

OIL CAPACITY : 1.55 liter

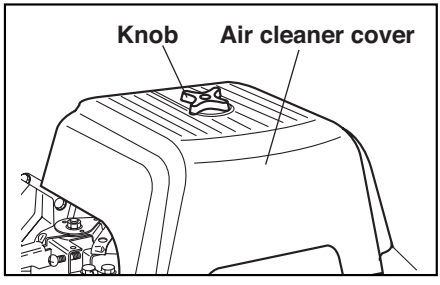


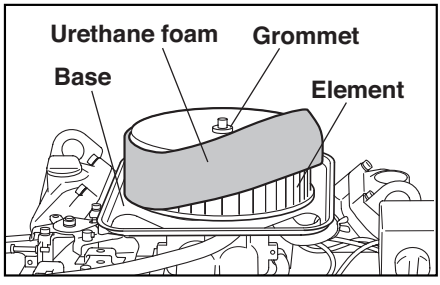
ENGINE OIL FILTER REPLACEMENT

- Initial engine oil filter replacement should be performed after 20 hours of operation. Thereafter replace the engine oil filter every 200 hours.
- When installing a new oil filter, apply oil to O-ring, attach the oil filter in position and tighten 2/3 turns by hand or with wrench after touching the O-ring to the sealing surface of engine.
- Run the engine for a minute ; stop the engine and check for oil leakage around the oil filter and recheck the oil level.

⚠ CAUTION

To prevent injury, pay attention to the spilled hot engine oil when replacing engine oil filter.





CLEANING AIR CLEANER

A dirty air cleaner element will cause starting difficulty, power loss, engine malfunctions, and shorten engine life extremely.

Always keep the air cleaner element clean. Replaced the air cleaner element set more often in dusty environments.

The air cleaner paper inner element and urethane foam outer element can be removed after removing knob and air cleaner cover. When installing, set the paper element and urethane foam on the air cleaner base. Check that the grommet is in position, and then install the cover with knob tightened securely.

- Urethane Foam cleaning
  Wash and clean the urethane foam in kerosene. Saturate in a mixture of 3 parts kerosene and 1 part engine oil, and then squeeze to remove excess oil. Clean or replace the urethane foam element every 50 hours. (more often in dusty environments)

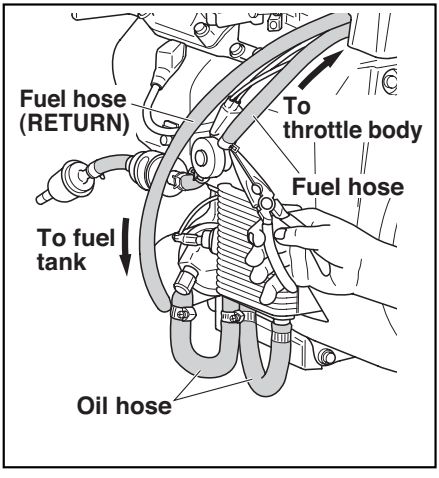
■ Paper element

Clean by tapping gently to remove dirt and blow off dust. Never use oil.
Clean or replace the paper element every 50 hours of operation, and replace element set every 200 hours or once a year.

Clean and replace air cleaner elements more often when operating in dusty environments.

CHECKING BOLTS, NUTS AND SCREWS

Retighten loose bolts and nuts.
Check for fuel and oil leaks.
Replace damaged parts with new ones.
Keep safety in your mind.



FUEL AND OIL HOSE REPLACEMENT

⚠ WARNING

Take extreme caution when replacing fuel hose ; gasoline is flammable.

Replace the fuel and oil hose every 1,000 hours or every year.
If fuel and oil hose leak is found, replace the fuel hose immediately.

CHECKING BATTERY

⚠ WARNING

Battery electrolyte is an acid and is poisonous and corrosive.
Serious injury results from contact with the skin, eyes or clothing.

If the electrolyte fluid is below level line, refill battery with distilled water.

HIGH ALTITUDE ENGINE OPERATION

The FI system is installed in this engine.

The air/fuel ratio when driven at the high ground is corrected automatically by this FI system.

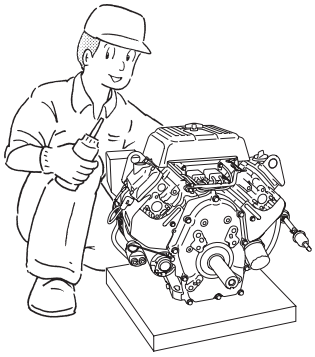
The automatic correction is possible up to 3000m(9800ft).

10. PREPARATIONS FOR STORAGE

USE UP THE FUEL

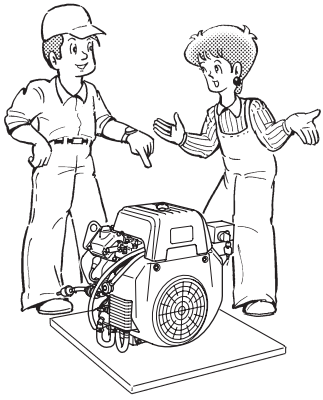
⚠WARNING Flame Prohibited

If you will not use the engine for more than 1 month, run the engine until there is no fuel left, and then store the equipment in a location with low humidity in order to prevent start-up problems and operation trouble due to deterioration of the fuel.



ENGINE OIL

- Change the engine oil with fresh oil.
- Remove the spark plug, pour about 5 cc of engine oil into the cylinder, slowly start the engine for 2 or 3 seconds, and re-install the spark plug.



CLEAN AND STORE

- Remove the spark plug wires from the spark plugs.
- Slowly turn the crankshaft until resistance is felt and leave it in that position.
- Clean the engine thoroughly with an oiled cloth, cover the engine, and store the engine indoors in a well ventilated, low humidity area.

11. SPECIFICATIONS

MODEL	EH72 FI
Type	Air-Cooled, 4-Stroke, V-Twin Cylinder, Horizontal P.T.O. shaft, OHV Gasoline Engine
Bore x stroke mm(in)	2-84 x 65 (3.31 x 2.56)
Displacement cm^3(cu. in)	720 (43.9)
Continuous Output kW (HP) / rpm	14.9 (20.0) / 3600
Maximum Output kW (HP) / rpm	20.9 (28.0) / 4000
Max. Torque N·m (kgf·m) / rpm	52.2 (5.32) / 2800
Direction of Rotation	Counterclockwise as viewed from P.T.O. shaft side
Lubricant	Automotive Engine Oil SAE #20, #30 or 10W-30 ; Class SE or higher (SG, SH or SJ is recommended)
Capacity of Lubricant liter (U.S. gal)	1.55 (0.41)
Fuel	Automotive Unleaded Gasoline
Spark plug	BPR5ES (NGK) or BPR4EY (NGK)
Starting System	Electric Starter
Dry Weight kg (lb)	46 (101.3)
Dimension (L x W x H) mm (in)	317 x 477 x 480 (12.5 x 18.8 x 18.9)
Valve Clearance (Intake & Exhaust)	0.1 ± 0.02 mm (0.0039 ± 0.0008 in) Note : Adjust the valve clearance while the engine is cold.
Emissions Durability Period (California only)	250 hours

(Proposition pour la Californie 65)

⚠ AVERTISSEMENT: ⚠

L'échappement du moteur de ce produit contient des produits chimiques connus par l'État de la Californie comme étant capables de causer le cancer, des défauts de naissance ou tout autre défaut de reproduction.

(Seulement pour la Californie)

INDICE D'AIR

Pour indiquer la conformité aux règlements d'émission de la Californie, une étiquette du fabriquant a été fournie indiquant le niveau d'indice d'air et la période de durabilité du moteur.

Le niveau d'indice d'air définit la propreté de l'échappement d'un moteur sur une certaine période de temps. Une barre analogique mesurée de "0" (l'air le plus propre) à "10" (l'air le moins propre) est utilisée pour indiquer le niveau d'indice de l'air du moteur. Un niveau plus bas d'indice d'air représente un échappement plus propre d'un moteur.

La période (en heures) pour laquelle le niveau d'indice d'air est mesuré est connue comme période de durabilité. Selon la taille du moteur, un choix des périodes de temps peut être utilisé pour mesurer le niveau d'indice d'air (voir ci-dessous).

Limite descriptive		Applicable aux émissions Période de durabilité
Modéré	-	50 heures (moteur de 0 à 80 cm^3)
		125 heures (moteur supérieur à 80 cm^3)
Intermédiaire	-	125 heures (moteur de 0 à 80 cm^3)
		250 heures (moteur supérieur à 80 cm^3)
Prolongé	-	300 heures (moteur de 0 à 80 cm^3)
		500 heures (moteur supérieur à 80 cm^3)
		1000 heures (225 cm^3 ou plus)

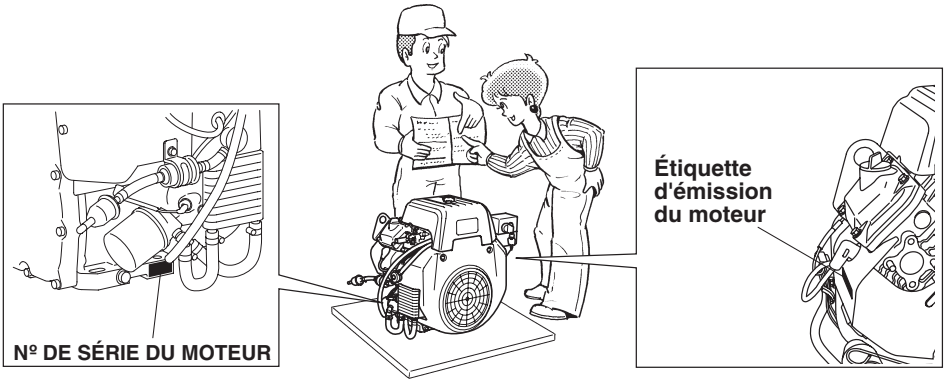
Notification : Cette étiquette du fabriquant doit rester sur le moteur ou la pièce d'équipement, et sera enlevée seulement par l'acheteur final avant son fonctionnement.

Notification : LA GARANTIE FÉDÉRALE CONTRE DÉFAUTS DE COMPOSANTS D'ÉMISSION et la GARANTIE DE CONTRÔLE D'ÉMISSION DE LA CALIFORNIE sont applicables seulement aux moteurs/générateurs qui sont conformes aux règlements d'émission des États-Unis de l'EPA (Agence de Protection de l'Environnement, Environmental Protection Agency) et de la CARB (Comité des Ressources de l'Air de la Californie, California Air Resources Board).

Notification : Le service de garantie sera assuré aux moteurs/générateurs exportés vers et utilisés dans les pays autres que les États-Unis par le distributeur dans chaque pays selon la police d'assurance applicable du moteur/générateur standard Robin.

PREAMBULE

Nous vous remercions d'avoir acquis un **MOTEUR ROBIN**.



Prenez le temps de vous familiariser avec les procédures de mise en marche, de fonctionnement et de maintenance, pour utiliser votre moteur dans les meilleures conditions de SECURITE et de PERFORMANCES.

Dans le souci constant d'améliorer la QUALITE de nos produits, certaines procédures et certaines spécifications sont succeptibles de changer sans préavis.

Lors de la commande de piéces détachées, préciser le MODELE et le NUMERO DE SERIE de votre moteur.

Veuillez inscrire dans les cases blanches le numéro de série de votre moteur.

SPEC NO. | E | H | | | | | | | | | | | |

Nº DE SERIE. | | | | | | | |

Pour avoir des renseignements sur votre distributeur ROBIN (et/ou le concessionnaire) le plus proche, consultez en cliquant sur l'adresse (URL) du site ROBIN suivant:

http://www.subaru-robin.jp

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SYMBOLES

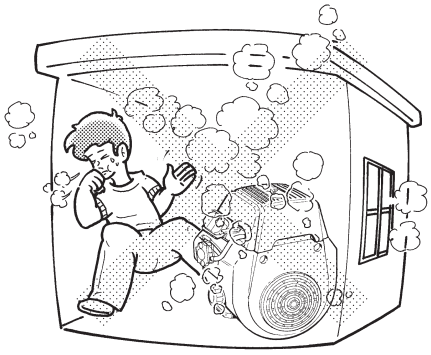
	Prière de lire le manuel.		*Couper la soupape de combustible lorsque le moteur n'est pas en service.*
	Ne pas toucher aux surfaces chaudes.		*Vérifier s'il y a perte du tuyau et des raccords.*
	Le gaz d'échappement est dangereux. Ne pas opérer la machine dans un endroit mal aéré ou fermé.		*Interdit de fumer, de faire du feu, d'approcher des flammes*
	Couper le moteur avant de refaire le plein.		*CHAUD, éviter de toucher l'emplacement chaud.*

	Marche		*Démarrage (démarreur électrique)*		*Carburant (Essence)*
	Arrêt		*Arrêt du moteur*		*Carburant (diesel)*
	Huile moteur		*Moteur froid*		*Couper le carburant*
	Ajouter de l'huile		*Moteur chaud*		*Dysfonctionnement de systeme de carburant*
	Batterie		*Préchauffage électrique (Aide au démarrage à basse température)*		*Volet d'air*
	Rapide		*Position de marche*		*Positive; polarité positive*
	Lent		*Position d'arrêt*		*Négative; polarité négative*
	Amorce		*Pousser l'amorce*		*Ne pas pousser l'amorce*
2X	*Deux fois*				

FRANÇAISE

1. SECURITE

Veuillez suivre ces conseils pour une utilisation correcte et sûre de votre moteur.



ECHAPPEMENT

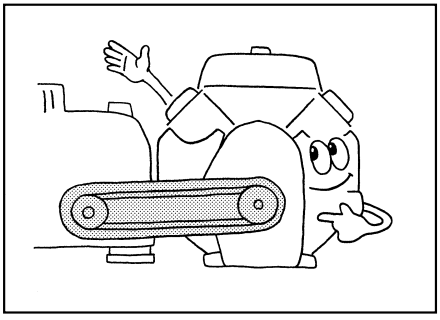
- Ne jamais respirer les gaz d'échappement.
  Ceux-ci contiennent de l'oxyde de carbone, un gaz incolore, inodore et extrêmement dangereux pouvant entraîner la perte de conscience ou la mort.
- Ne jamais utiliser le moteur dans un endroit confiné ni un endroit insuffisament ventilé, tel que : cave, tunnel, etc....
- Etre très prudent lors de l'utilisation du moteur près d'enfants ou d'animaux, ou de quelconques tres vivants.
- Eviter d'obstruer le pot d'échappement.

PLEIN DE CARBURANT

- Arrêter le moteur avant de faire le plein.
- Ne pas faire déborder le carburant lors du remplissage.
- Essuyer soigneusement toute trace de carburant sur le moteur et attendre que tout soit évaporé avant le démarrage.
- Lors des vidanges d'huile s'assurer que le bouchon du réservoir est bien fermé.

PREVENTION DES INCENDIES

- Ne pas approcher du moteur avec une cigarette ou toute autre flamme.
- Ne pas utiliser le moteur près d'un stockage de matières inflammables.
- Utiliser le moteur à un mètre de tout obstacle : mur meuble, porte, ...
- Tenir le moteur à l'écart de tout matériau inflammable ou dangereux (ordures, chiffons, lubrifiants, explosifs).



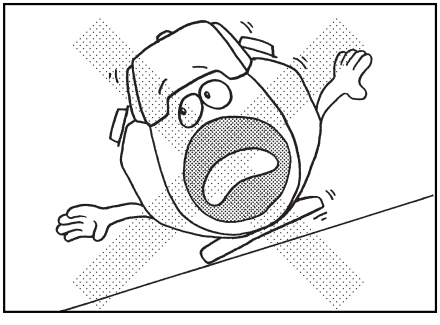
PROTECTIONS

■ **Installer des protections sur les pièces en mouvement.**
Si vous utilisez des équipements tels que poulies, courroies, etc..., protégez-les avec un cache pour éviter tout accident.

■ **Faire attention aux pièces brulantes.**
Le pot d'échappement et d'autres pièces du moteur sont très chaudes lors de la marche ou juste après l'arrêt du moteur.
Utilisez donc le moteur dans un endroit sûr et à l'écart des enfants.

■ Ne jamais réglar la machine lorsque le moteur tourne.
Il faut débrancher le fil de bougie avant toute intervention. Le fait de tourner le vilebrequin à la main pour régler la machine peut suffire à faire démarrer le moteur.

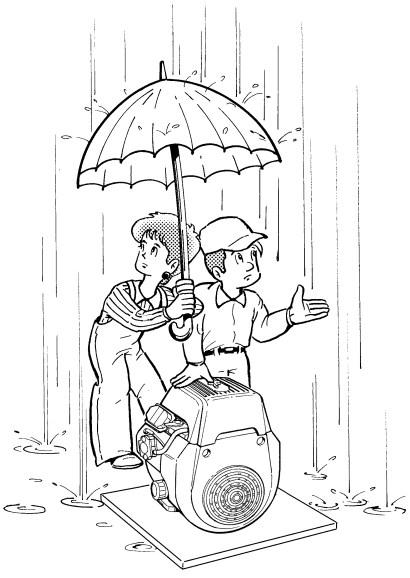
■ Ne jamais utiliser le moteur sans son régulateur ou à un régime excédent 3600t / mn. en charge.



ENVIRONNEMENTS

■ Utiliser le moteur sur un sol plan et exempt de tout défaut.

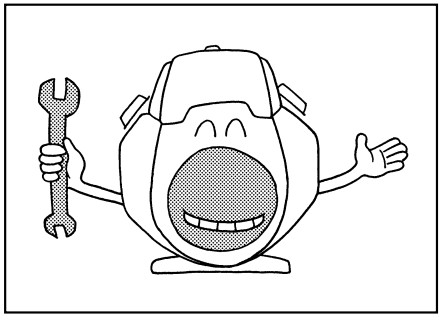
NOTE
Utiliser le moteur sur un plan inchiné peut provoquer un bris du vilebrequin par défaut de lubrification.



■ **Vidanger le carburant avant de transporter le moteur.**

■ **Ne pas déplacer le moteur lorqu'il est en marche.**

■ Garder le moteur au sec (ne pas l'utiliser sous la pluie).



VERIFICATIONS AVENT LE DEMARRAGE

■ Vérifier le bon serrage et l'absence de fuites aux flexibles de carburant et aux raccords. Toute fuite de carburant présente un danger potentiel.

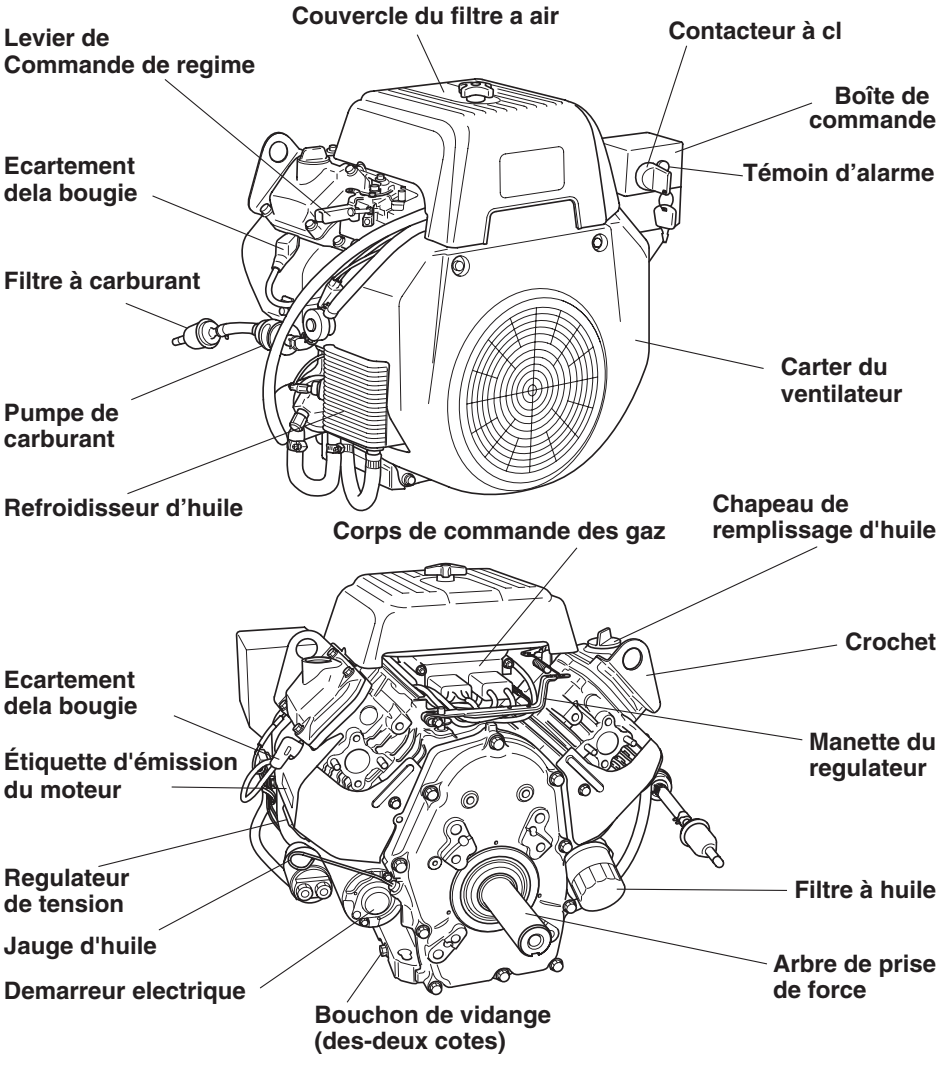
■ Vérifier le bon serrage des boulons et des écrous. Tout boulon ou écrou desserré peut entraîner des problèmes sérieux du moteur.

■ Vérifier quotidiennement le niveau de l'huile moteur et faire l'appoint si nécessaire.

■ Vérifier le niveau du carburant et faire le plein si nécessaire. Ne pas remplir le réservoir au-delà de la limite maxi.

■ Eviter de porter des vêtements lâches pour utiliser le moteur. Tabliers, serviettes, ceintures et autres peuvent être pris dans le moteur ou le train moteur et être à l'origine d'un accident grave.

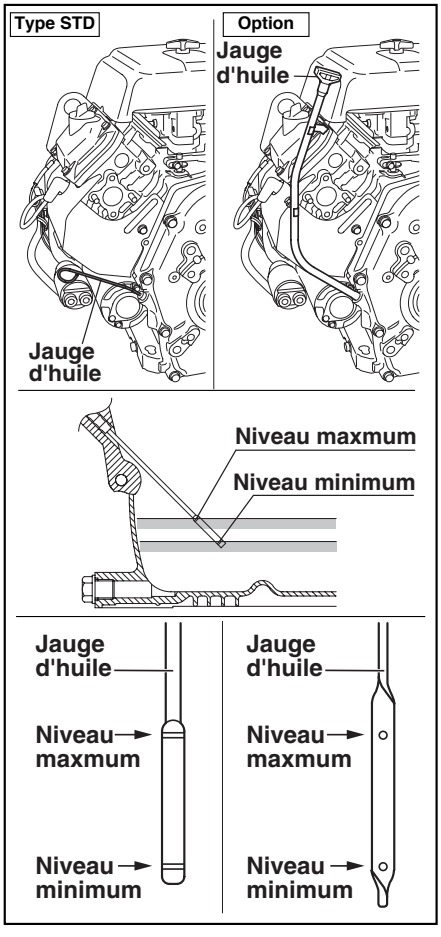
2. DESCRIPTION

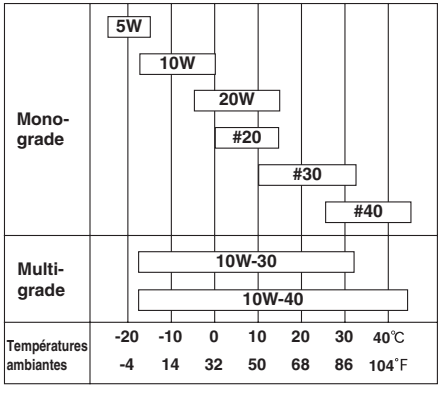


REMARQUES :

- Le réservoir de carburant, la soupape (le type à cuvette de dépôt est recommandé), les durites à carburant et le filtre de carburant sont requis pour connecter la source de carburant au corps de commande des gaz.
- Prévoir une batterie de 12V-36AH ou plus et des câbles appropriés. Procéder au cablage nécessaire pour garantir le bon fonctionnement du moteur. (Voir la Section 4 Installation de la Batterie pour des instructions.)

3. VERIFICATION AVANT DEMARRAGE





VERIFICATION DU NIVEAU D'HUILE (QUOTIDIENNE)

Avant de procéder au contrôle du niveau d'huile ou à l'appoint d'huile, vérifier que le moteur est à l'arrêt et qu'il se trouve sur une surface stable et horizontale.

■ Refaire le niveau si nécessaire avec une qualité d'huile appropriée.
Capacité d'huile : 1,55 litre

■ Pour faire le plein d'huile moteur, placer celui-ci à l'horizontale et faire le plein jusqu'au repère de niveau maxi de la pige. Procéder au contrôle du niveau après avoir remis la pige de niveau en place.

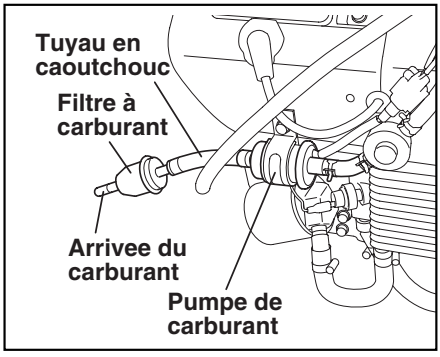
■ Après une vidange de l'huile, faire tourner le moteur et revérifier le niveau. Le niveau de l'huile risque de baisser dans le réservoir une fois le filtre à huile plein. Faire l'appoint en huile jusqu'au repère de niveau maxi.

■ Changer l'huile dés qu'elle est dégradée.
(Voir la Section 8 le tableau de maintenance)

■ Utiliser l'huile détersive pour véhicules à moteur à 4 temps de la Classe de service API SE ou de qualité supérieure (SG, SH ou SJ est recommandé).

■ Si vous utilisez une huile multigrade la consommation d'huile sera légèrement augmentée, quand la température ambiante augmentera.

VERIFICATION DU CARBURANT



⚠ ATTENTION

Ne pas remplir le réservoir lorsque le moteur est en marche, près d'une cigarette ou près d'une flamme.

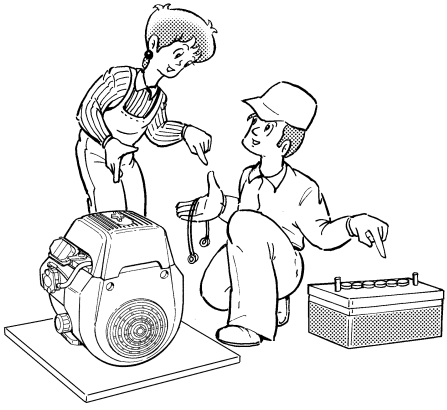
NOTE :

CE MOTEUR EST CERTIFIÉ POUR L'USAGE AVEC L'ESSENCE SANS PLOMB POUR AUTOMOBILE.

- Le moteur n'étant pas pourvu d'un réservoir de carburant, prévoir un réservoir à part.
  Raccorder un robinet et un filtre à carburant entre le réservoir et la pompe. Fixer soigneusement les flexibles de carburant à la pompe pour éviter toute fuite.
- Disposer le réservoir à environ 66 cm en-dessous du corps de commande des gaz. Si le réservoir est installé dans une position supérieure par rapport au corps de commande des gaz, installer un robinet de coupure entre le réservoir et la pompe. Fermer ce robinet quand le moteur n'est pas en fonction pour éviter de noyer le corps de commande des gaz.
- Tout débranchement des flexibles de carburant peut entraîner un accident grave. Bien raccorder toutes les canalisations de carburant en insérant à fond le flexible sur l'embout et en fixant en place à l'aide d'un collier.
- Utilisez seulement l'essence sans plomb pour automobile.
- Couper le moteur et fermer le robinet de carburant avant de refaire le plein du réservoir.
- Avant le démarrage du moteur l'essuyer soigneusement.

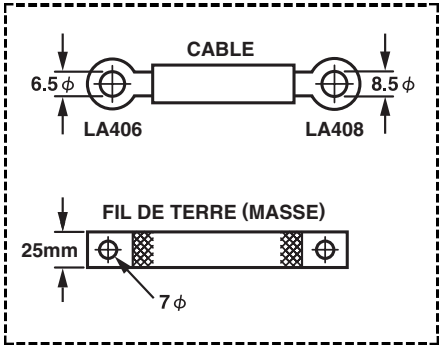
4. INSTALLATION DE LA BATTERIE

Pour garantir le bon fonctionnement du moteur de démarrage, procéder à la mise en place du câblage électrique avant de mettre le moteur en fonction normalement.



PIECES NECESSAIRES

- Utiliser une batterie de 12V-36AH ou plus si possible.
- Raccorder la batterie, le contacteur à clé et le démarreur électrique à l'aide d'un câble approprié et d'un fil de mise à la terre.



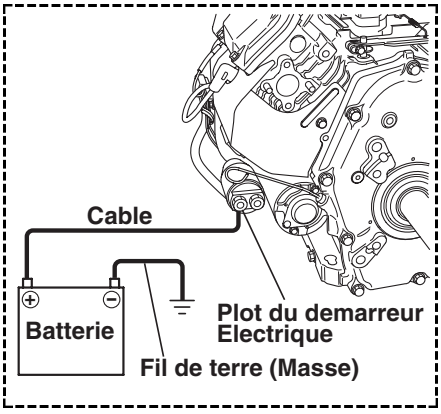
CÂBLE DE BATTERIE

LONGUEUR DE CABLE	DIAETRE DE CABLE	TYPE DE CABLE		
		AWG (BS) BWG	SAE	JIS
Inf. à 1,5 m	7,3 mm	1	6	AV15
Entre 1,5 m et 2,5 m	8,5 mm	0	4	AV20
Entre 2,5 m et 4,0 m	10,8 mm	3/0	2	AV30

Pour la mise à la terre utilisez une tresse métallique de largeur mini 25 mm. (SAE TYPE 4)

FIL DE CONTACT

LONGUEUR DE CABLE	DIAETRE DE CABLE	TYPE DE CABLE		
		AWG (BS)	BWG	JIS
Inf. à 1,5 m	1,5 mm	14	16	AV1,25
1,5 m et 3,0 m	1,9 mm	12	14	AV2
3,0 m et 5,0 m	2,4 mm	10	13	AV3

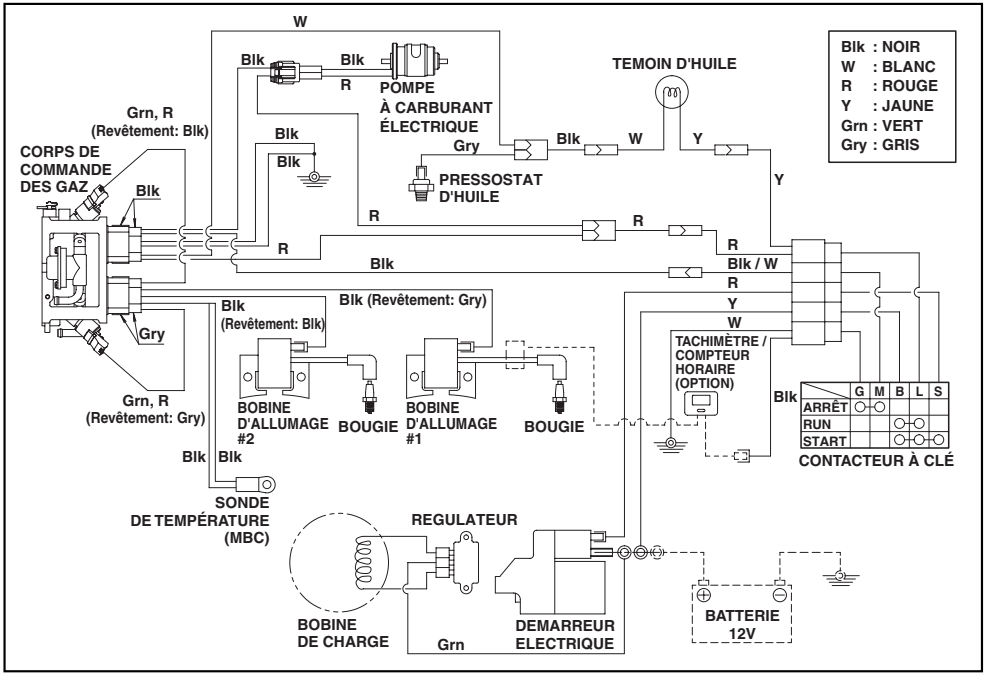


RESEAU ELECTRIQUE

- **Raccorder le plot positif du démarreur électrique et le plot positif de la batterie à l'aide d'un câble de batterie.**
- **Brancher la borne négative de la batterie sur le corps du moteur ou sur la machine qui lui est accouplée.**

NOTE
Bien bloquer les écrous pour éviter tout désserrage par vibration.

SCHEMA ELECTRIQUE DU DEMARREUR



L'équipement facultatif est indiqué en pointillé. Choisir des câbles de section appropriée et raccorder la batterie comme indiqué par les traits en pointillé sur le schéma de câblage.

5. UTILISATION

NOTE
La méthode de fonctionnement suivante concerne le levier de commande de vitesse de type STD. Quant au levier de commande de vitesse de type fixé (exemple spéc. du générateur), ne le déplacez pas sinon le composant du générateur tel que régulateur de tension risque de s'endommager.

MISE EN MARCHE

ROBINET DE CARBURANT

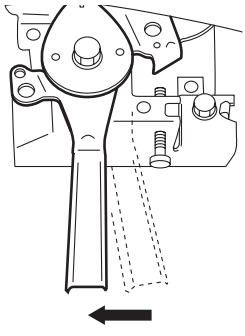
1

(Fourni par le fabricant de l'équipement)

Ouvrir le robinet de carburant.

LEVIER DE COMMANDE DE REGIME

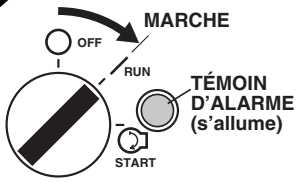
2



Réglez le levier de comamnde de régime sur un point à 1/3 de la position de regine maximum.

TIRETTE DU STARTER

3

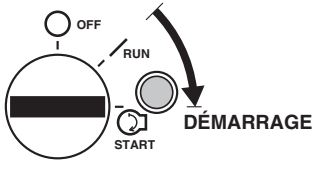


Si une boîte de commande est installée, tourner le contacteur à clé et le régler à la position (MARCHE). Vérifier que le témoin d'alarme et autres témoins sont bien illuminés (en rouge).

- Quand le contacteur à clé est réglé à la position de marche (MARCHE), un bruit de fonctionnement de la pompe à carburant peut être produit pendant deux ou trois secondes (ceci ne représente pas un défaut de fonctionnement).

CONTACTEUR A CLE

4

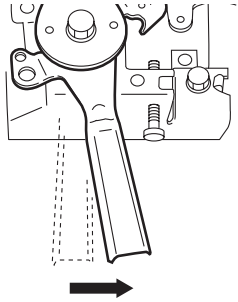


Insérer la clé dans le contacteur et mettre sur la position (DÉMARRAGE) pour démarre le moteur.

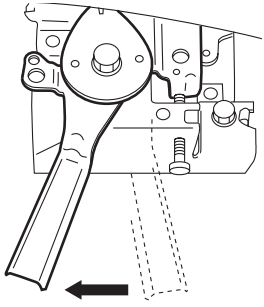
- Méme si le moteur ne part pas, n'actionnez pas le démarreur plus de cinq secondes de suite.
- Mettre la clé en position (MARCHE) et attendre 10 secondes avant de refaire un essai.
- Ne jamais faire fonctionner le démarreur pendant que le moteur tourne.

MARCHE

LEVIER DE COMMANDE DE REGIME



Après le démarrage du moteur mettre le levier en position ralenti pour faire chauffer pandant quelques minutes le moteur.



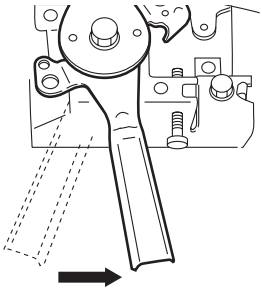
Puis régler progréssivement le régime jusqu'à la vitesse requise.

NOTE :
Quand un régime maxi n'est pas nécessaire, réduire la vitesse du moteur (ralenti) par réglage de la manette de commande pour économiser le carburant et garantir une plus longue durée de vie du moteur.

ARRET

LEVIER DE COMMANDE DE REGIME

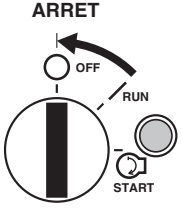
1



Mettre le levier enposition de ralenti et faire tourner le moteur ainsi pendant 2 à 3 minutes, avant de l'arrêter.

CONTACTEUR A CLE

2



Mettre la clé sur la position (ARRET).

ROBINET DE CARBURANT

3

Refermer le robinet d'essence

FRANÇAISE

6. RECHERCHE DES PANNES

QUAND LE MOTEUR NE PART PAS

■ Vérifiez ces quelques points avant de contacter votre revendeur ROBIN.

■ Si cela ne suffit pas, n'hésitez pas à porter votre moteur chez le revendeur ROBIN le plus proche.

Est-ce que la bougie est mouillée avec de l'essence?

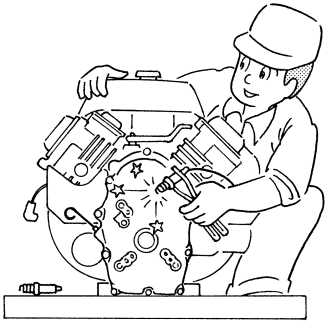
Si la bougie est desserrée, revissez-la.

La bougie est-ell humide d'essence?

1. Fermer le starter et faire tourner le moteur lentement pendant 2 ou 3 secondes. Enlever la bougie et vérifier si l'électrode est humide. Si c'est le cas, l'alimentation en carburant s'effectue correctement.
2. Si l'électrode est sèche, chercher l'endroit où le passage du carburant est obturé. (Vérifier la prise de carburant du corps de commande des gaz et la prise du filtre de carburant)
3. Dans le cas où le moteur ne dèmarrerait pas avec une bonne alimentation d'essence, essayez en refaisant le plein avec de l'essence neuve.

⚠ ATTENTION

Avant de procéder au contrôle de la bougie, nettoyer soigneusement toute trace de carburant. Eloigner la bougie de son trou de bougie. Ne pas tenir la bougie directement à la main pendant le contrôle.



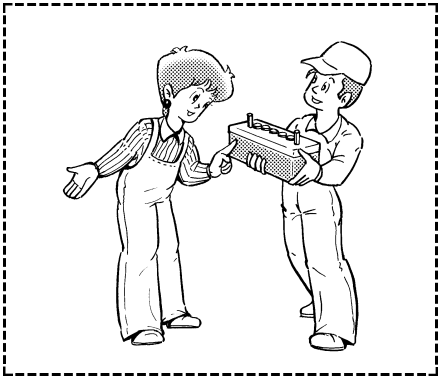
Y a t'il une étincelle assez forte à l'électrode ?

1. Démonter la bougie et la brancher sur son antiparasite.
   Tirer la poignée du lanceur en maintenant la bougie sur le corps du moteur pour la mettre au contact de la masse.
2. Si l'étincelle est trop faible ou inexistante, essayez avec une bougie neuve.
3. Si la bougie neuve ne donne pas de meilleurs résultats, cela signifie que l'allumage est endommagé.
   Dans ce cas apportez votre moteur chez un réparateur ROBIN.

A propos du témoin d'alarme

■ Vérifier l'huile pour voir si la lampe d'alarme est illuminée durant la conduite. (Voir la Section "3. VERIFICATION AVANT DEMARRAGE" pour les instructions.)

■ Faire inspecter le véhicule par l'atelier du concessionnaire ou un centre d'entretien si le témoin d'alarme clignote durant la conduite.



Votre batterie est-elle bien chargée?

Vérifier la batterie. Elle est peut-être déchargée et dans l'impossibilité de commander le démarreur électrique. Veuillez vérifier le niveau de charge de votre batterie.

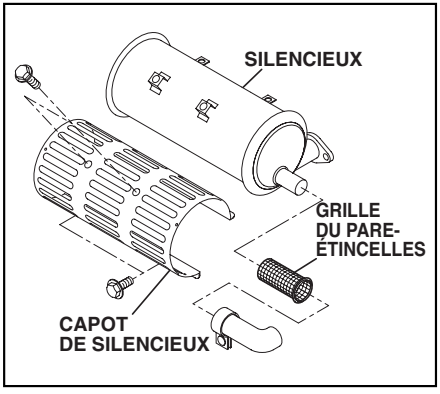
7. PARE-ÉTINCELLES (OPTIONNEL)

Dans une région sèche et boisée, il est recommandé de doter le produit d'un pare-étincelles. Certaines zones requièrent l'utilisation d'un pare-étincelles. Consultez les lois et recommandations en vigueur localement avant de mettre votre produit en fonction.

Le pare-étincelles doit être nettoyé rapidement pour qu'il puisse continuer à fonctionner normalement. Un pare-étincelles encrassé :

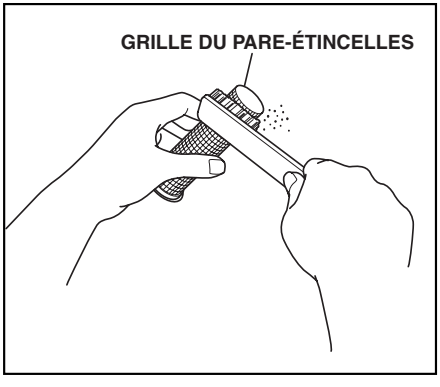
- Bloque la circulation des gaz d'échappement
- Réduit la puissance du moteur
- Augmente la consommation de fuel
- Rend le démarrage difficile

Si le moteur a été en fonctionnement, le silencieux et le pare-étincelles chaufferont beaucoup. Laisser refroidir le silencieux avant de nettoyer le pare-étincelles.



Comment enlever le pare-étincelles

1. Enlever les écrous de bride du capot recouvrant le silencieux et retirer le capot.
2. Enlever la vis spéciale du pare-étincelles et retirer le pare-étincelles du silencieux.



Nettoyer la grille du pare-étincelles

Se servir d'une brosse pour nettoyer les dépôts de charbon. Faites attention à ne pas endommager la grille.

Le pare-étincelles ne doit avoir aucune fracture ou aucun trou. Le remplacer s'il est endommagé.

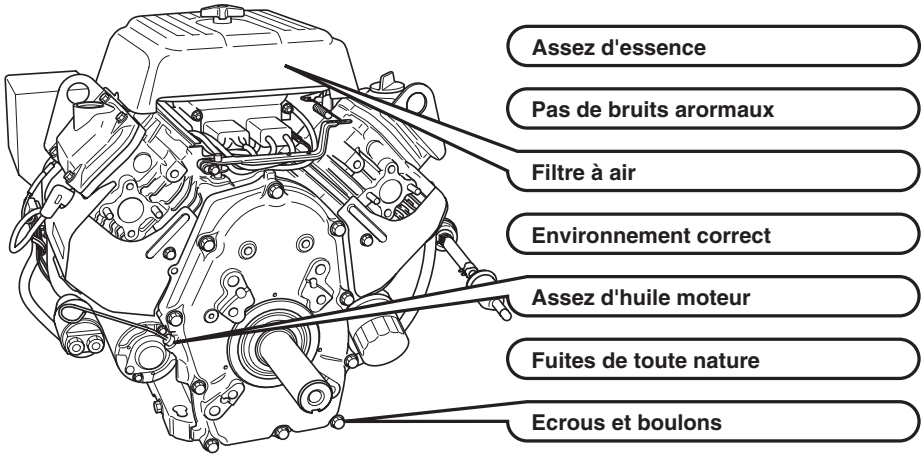
Installer le pare-étincelles et la protection du silencieux dans l'ordre inverse du démontage.

8. TABLEAU DE MAINTENANCE

L'ENTRETIEN, LE REMPLACEMENT OU LA RÉPARATION DES DIPOSITIFS ET SYSTÈMES ANTIPOLLUTION PEUVENT ÊTRE EXÉCUTÉS PAR TOUT ÉTABLISSEMENT OU PROFESSIONNEL DE LA RÉPARATION DES MOTEURS NON ROUTIERS.

VERIFICATION QUOTIDIENNE

Avant d'utiliser le moteur vérifier les points suivants.



INSPECTION PERIODIQUE

Une inspection régulière est vitale pour la vie et les performances de votre moteur. Veuillez vous référer à la table ci-dessous pour les périodes d'entretien. La table est basée sur une utilisation normale du moteur.

IL EST AUSSI NÉCESSAIRE QUE L'UTILISATEUR DE CE MOTEUR EFFECTUE DES OPÉRATIONS DE MAINTENANCE ET DE RÉGLAGE SUR LES PIÈCES ASSOCIÉES AU CONTRÔLE DES ÉMISSIONS POLLUANTES CI-DESSOUS POUR PRÉSERVER L'EFFICACITÉ DU SYSTÈME ANTIPOLLUANT.

Le système anti-polluant est constitué des pièces suivantes :

(1) Corps de commande des gaz et pieces internes et pièces internes
(2) Système d'enrichissement de démarrage à froid, le cas échéant
(3) Collecteur d'admission, le cas échéant
(4) Éléments de l'épurateur d'air
(5) Bougie d'allumage
(6) Dispositif d'allumage Magnétique ou électronique
(7) Système d'avancement / retard, le cas échéant
(8) Collecteur d'échappement, le cas échéant
(9) Tuyaux, courroies, connecteurs et assemblages

Le calendrier de maintenance indiqué dans le tableau suivant s'applique pour fonctionnement normal du moteur. Si celui-ci est utilisé en environnement extrêmement poussiéreux ou en situation de charge plus pressante, les intervalles pour les opérations de maintenance devront être raccourcis en fonction du degré de contamination de l'huile, de l'encrassement des éléments de filtrage, de l'usure des parties, etc.

Tableau d'entretien périodique

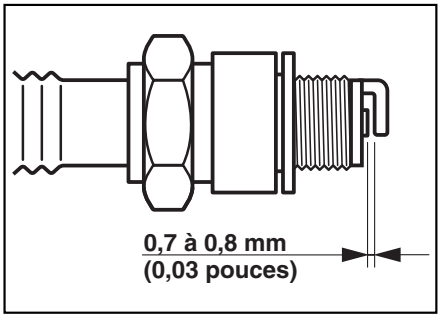
Points d'entretien	Toutes les 8 heures (Chaque jour)	Toutes les 50 heures	Toutes les 200 heures	Toutes les 500 heures	Toutes les 1000 heures
Nettoyer le moteur et verifier ecrous et boulons	● (Chaque jour)				
Verifier et refaire plein d'huile	● (remplir au niveau supérieur tous les jours)				
Vidanger l'huile moteur (*Note 1)	● (20 premières heures)	● (Toutes les 100 heures)			
Changer le filtre à huile moteur (*Note 1)	● (20 premières heures)		●		
Contrôle du niveau d'électrolyte de batterie		●			
Verifer la bougie		●			
Nettoyer le filtre a air		●			
Pare-étincelles (partie en option)		● (Toutes les 100 heures)			
Changement de l'élément du filtre à air			●		
Nettoyer le filtre a essence			●		
Nettoyage et réglage des bougies et des électrodes			●		
Remplacer la bougie d'allumage				●	
Nettoyer le charbon sur la tête de cylindre				●	
Nettoyer le Corps de commande des gaz (*Note 2)				●	
Nettoyage du bloc-moteur (carter d'huile)				●	
Verifier et regler jeu du poussoir de soupape				●	
Remplacer les canalisations d'essence					●(tous les ans)
Révision du moteur (*Note 2)					●

*Note 1 : Au départ, le changement d'huile et le remplacement du filtre à huile doivent être effectués après 20 heures de fonctionnement.
Après quoi, changer l'huile toutes les cent (100) heures et remplacer le filtre à huile toutes les 200 heures. Avant de changer l'huile, disposer comme il convient de l'huile usée. Ne pas l'écouler dans les égouts ou dans les cours d'eau. Les règlements en vigueur localement pour les diverses zones et environnements vous donneront des instructions plus détaillées sur les modes appropriés d'élimination des déchets.

*Note 2 : En ce qui concerne les procédures, voir le Manuel d'Entretien et de Réparation ou consulter votre centre ROBIN de service le plus proche.

*Note 3 : Il pourra être nécessaire d'augmenter la fréquence des changements d'huile, des remplacements du filtre à huile et des interventions d'entretien de l'épurateur d'air selon les conditions de fonctionnement.
Par exemple, en cas d'un environnement poussiéreux, de températures ambiantes élevées et de charges élevées du moteur.

9. COMMENT REPAPER

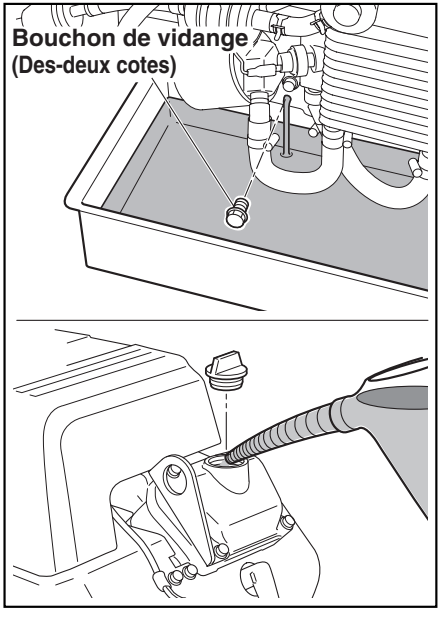


VERIFICATION DE LA BOUGIE

■ Nettoyer la bougie à la brosse métallique.

■ Contrôler l'intervalle des électrodes.
Régler l'intervalle sur :
0,7mm à 0,8mm (0,03 pouces)

■ Utiliser une bogie adaptée :
BPR5ES (NGK) ou BPR4EY (NGK)



VIDANGE MOTEUR

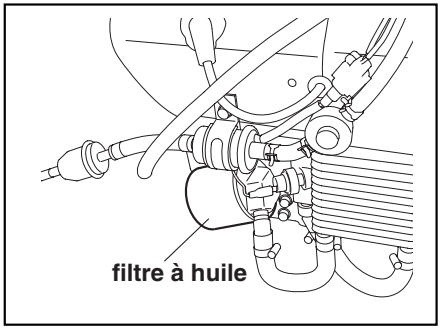
■ Première vidange après 20 heures de marche.

■ Vidanges successives toutes les 100 heures.

1. Pour vidanger, arrêter le moteur et dévisser le boulon de vidange.
2. Revisser le bouchon de vidange lorsque le carter est vide.
3. Se référer au tableau d'huile recommandée.

   (Voir la Section 3 Verification avant demarrage)
4. Toujours utiliser le bon grade et une huile propre.
   Tout écart peut entrainer de graves dommages pour le moteur.

   CONTENANCE EN HUILE : 1,55 litre

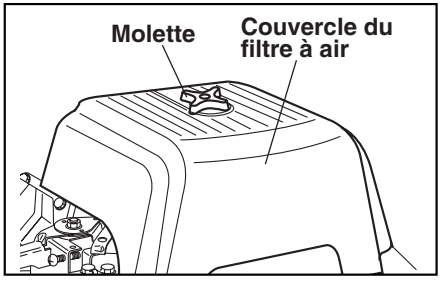


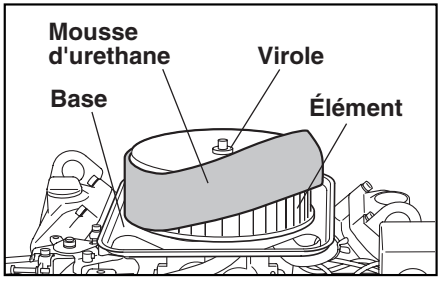
CHANGEMENT DU FILTRE A HUILE MOTEUR

- Le premier remplacement du filtre à huile moteur doit être effectué au bout de 20 heures de marche. Procéder ensuite à ce remplacement toutes les 200 heures d'utilisation.
- A l'installation d'un filtre à huile moteur neuf, enduire le joint torique d'huile, mettre le filtre à huile en position et visser de 2/3 de tour à la main ou à l'aide d'une clé depuis la position de contact du joint torique et de la surface d'étanchéité.
- Faire tourner le moteur pendant une minute : couper le moteur puis vérifier l'absence de fuites d'huile autour du filtre à huile et vérifier le niveau de l'huile.

⚠ PRECAUTION

Pour éviter tout accident, ne pas renverser d'huile sur le moteur chaud pendant le remplacement du filtre à huile.





NETTOYAGE DU FILTRE A AIR

Un élément de filtre à air sale peut provoquer des difficultés au démarrage, une perte de puissance, des pannes du moteur et réduit de beaucoup la vie du moteur. Toujours maintenir l'élément filtrant propre.

L'élément interne en papier et l'élément externe en mousse d'uréthane du filtre à air sont démontables après dépose de la molette et du couvercle du filtre à air.
A la repose, installer l'élément en papier et la mousse d'uréthane sur la base du filtre à air. Vérifier que la virole est en bonne position, reposer le couvercle et le fixer soigneusement à l'aide de la molette.

- Nettoyage de la mousse d'uréthane
  Laver et nettoyer la mousse d'uréthane à l'aide de kérosène. Laisser tremper dans une solution 3/4 kérosène et 1/4 huile moteur puis essorer soigneusement. Nettoyer ou changer l'élément en mousse d'uréthane toutes les 50 heures (ou plus souvent en cas d'utilisation en environnement poussiéreux).

■ Elément en papier

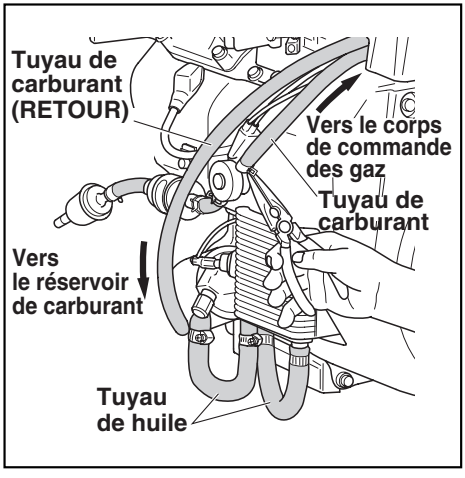
Nettoyer en tapotant doucement le papier et en soufflant pour enlever la poussière. Ne jamais utiliser d'huile. Nettoyer l'élément en papier toutes les 50 heures de marche et changer cet élément toutes les 200 heures ou tous les ans.

Nettoyer et changer plus souvent les éléments du filtre à air en cas d'utilisation en environnement poussiéreux.

VERIFIER LES VIS, LES BOULONS ET LES ECROUS.

Revisser les boulons et écrous dévissés. Vérifier s'il n'y a pas de fuite. Remplacer les piéces endommagées.

SOYEZ SUR DE VOTRE MOTEUR.


Tuyau de carburant (RETOUR)
Vers le corps de commande des gaz
Tuyau de carburant
Vers le réservoir de carburant
Tuyau de huile

CHANGEMENT DU FLEXIBLE DE CARBURANT

⚠ AVERTISSEMENT

Prendre les plus grande précautions au changement d'un flexible de carburant : l'essence est un produit inflammable.

Remplacez le tuyau de carburant et d'huile toutes les 1.000 heures ou chaque année. En cas de fuite, changer immédiatement le flexible.

VERIFICATION DE LA BATTERIE

⚠ AVERTISSEMENT

L'électrolyte de batterie est un acide et, à ce titre, un produit dangereux et corrosif.
Des blessures graves peuvent résulter d'un contact avec la peau ou les vêtements.

Si le niveau d'électrolyte est trop bas, refaire le plein avec de l'eau distillée.

FONCTIONNEMENT DU MOTEUR À HAUTE ALTITUDE

Ce moteur est doté du système FI.

Le rapport air/carburant durant la conduite à haute altitude est corrigé automatiquement grace à ce système FI.

La correction automatique est possible jusqu'à 3000 mètres (9800 pieds).

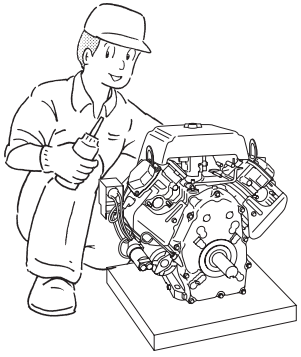
10. STOCKAGE

UTILISEZ TOUT LE CARBURANT JUSQU'À SON ÉPUISEMENT

⚠AVERTISSEMENT

Interdit de faire du feu

Si vous n'utilisez pas le moteur pour plus d'un mois, faites le marcher jusqu'à ce que le carburant soit complètement épuisé, puis rangez l'équipement dans un endroit présentant une basse humidité afin d'éviter tous problèmes de démarrage et de fonctionnement dû à la détérioration du carburant.



HUILE

- Mettre de l'huile neuve dans le moteur.
- Enlever la bougie et verser lentement environ 5 cm^3 d'huile moteur dans le cylindre.
  Faire tourner le moteur pendant 2 ou 3 secondes et reposer la bougie.

NETTOYEGE ET ENTREPOSAGE

- Déposer les fils des bougies.
- Faire tourner lentement le vilebrequin jusqu'à sentir une résistance et le laisser dans cette position.
- Nettoyer soigneusement le moteur à l'aide d'un chiffon imbibé d'huile, couvrir le moteur et le ranger à l'abri, dans un endroit bien aéré et sans humidité excessive.

11. SPÉCIFICATIONS

MODÉLE	EH72 FI
Type	Moteur à essence à ACT, arbre de prise de mouvement horizontal, double cylindre en V, 4 temps, refroidi par air
Course x alésage mm(pouces)	2-84 x 65 (3.31 x 2.56)
Cylindrée cm^3(cu. pouces)	720 (43,9)
Puissance continue kW (CV) / tr/mn	14,9 (20,0) / 3600
Puissance maximum kW (CV) / tr/mn	20,9 (28,0) / 4000
Couple Max. N·m (kgf·m) / tr/mn	52,2 (5,32) / 2800
Sens de rotation	Sens inverse des aiguilles d'une montre face à l'arbre de prise de force
Lubriflant	Huile pour moteur automobile SAE #20, #30 ou 10W-30, Classe SE, SF ou mieux (SG, SH ou SJ est recommandé)
Contenance en lubrifiant litre (U.S. gal)	1,55 (0,41)
Carburant	Essence sans plomb pour automobile
Bougie	BPR5ES (NGK) ou BPR4EY (NGK)
Démarrage	Démarreur électrique disponible
Poide à vide kg (livre)	46 (101,3)
Dimensions (Lo x La x H) mm (pouces)	317 x 477 x 480 (12,5 x 18,8 x 18,9)
Jeu de soupapes (Admission & Échappement)	0,1 ± 0,02 mm (0,0039 ± 0,0008 pouces) Note : Régler le jeu de soupapes à moteur froid.
Période de durabilité des émissions (Californie seulement)	250 heures

(Propuesta California 65)

⚠ AVISO: ⚠

Los gases de escape de este producto contienen agentes químicos que, según el Estado de California, causan cáncer, defectos de nacimiento u otros efectos perjudiciales reproductivos.

(California solamente)

ÍNDICE DE AIRE

Para mostrar el cumplimiento de las regulaciones sobre las emisiones de California, se ha colocado una etiqueta que muestra el nivel de Índice de aire y el período de durabilidad de este motor.

El nivel del Índice de aire define el grado de limpieza de las emisiones de escape del motor en un período de tiempo. Se emplea un gráfico de barras escalado desde "0" (más limpio) a "10" (menos limpio) para indicar el nivel del Índice de aire del motor. Un nivel de Índice de aire más bajo representa unas emisiones de escape más limpias del motor.

El período de tiempo (en horas) que se mide el nivel del Índice de aire se denomina período de durabilidad. Dependiendo del tamaño del motor, puede emplearse una selección de períodos de tiempo para medir el nivel del Índice de aire (vea más abajo).

Término descriptivo		Aplicable al período de durabilidad de las emisiones
Moderado	-	50 horas (motores de 0 a 80 cc) 125 horas (motores de más de 80 cc)
Intermedio	-	125 horas (motores de 0 a 80 cc) 250 horas (motores de más de 80 cc)
Extendido	-	300 horas (motores de 0 a 80 cc) 500 horas (motores de más de 80 cc) 1000 horas (225 cc o más)

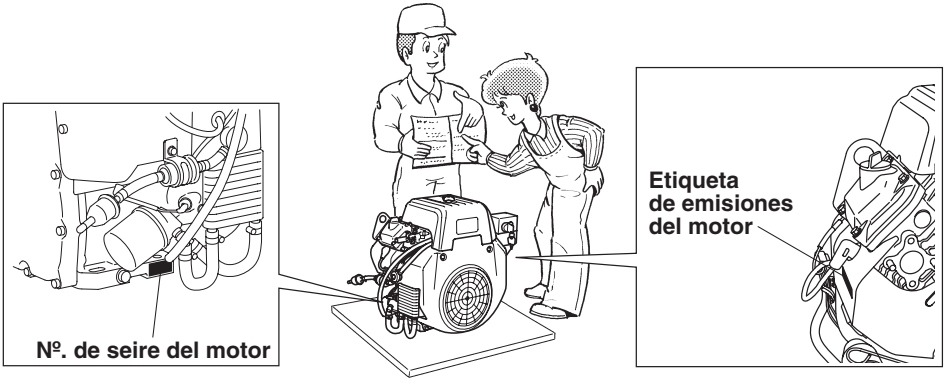
Observación : Esta etiqueta deberá quedar en este motor o pieza de equipo, y sólo podrá extraerla el comprador final antes de la operación.

Observación : La GARANTÍA POR DEFECTOS DE COMPONENTES DE EMISIONES FEDERAL y la GARANTÍA DE CONTROL DE EMISIONES DE CALIFORNIA son aplicables sólo a los motores/generadores que satisfacen las regulaciones de emisiones de EPA (Environmental Protection Agency) y de CARB (California Air Resources Board) en los EE.UU.

Observación : El servicio de garantía de los motores/generadores exportados y que se empleen en países que no sean los EE.UU. deberá efectuarlo el distribuidor de cada país de acuerdo con la política de garantía estándar de motores/generadores de Robin según sea aplicable.

INTRODUCCIÓN

Muchas gracias por comprar un **MOTOR ROBIN**.



Este motor ROBIN suministrará la energía necesaria para poder alimentar diferentes máquinas y equipos.
Tómese el tiempo necesario para familiarizarse con los procedimientos apropiados de operación y mantenimiento a fin de lograr la máxima seguridad y rendimiento de este producto.
Debido a los constantes esfuerzos para mejorar nuestros productos, ciertos procedimientos y especificaciones están sujetos a cambios sin previo aviso.
Cuando solicite piezas de repuesto, indique siempre el MODELO, ESPECIFICACIÓN y el NÚMERO DE SERIE del motor. Rellene los siguientes espacios en blanco después de comprobar el número de su motor.

Nº DE ESPEC. | E | H | | | | | | | | | | | |

Nº. SERIE | | | | | | | |

Para encontrar al distribuidor (y/o concesionario) ROBIN que le quede más cercado, búsquelo en nuestro sitio en la Web en la URL siguiente;

http://www.subaru-robin.jp

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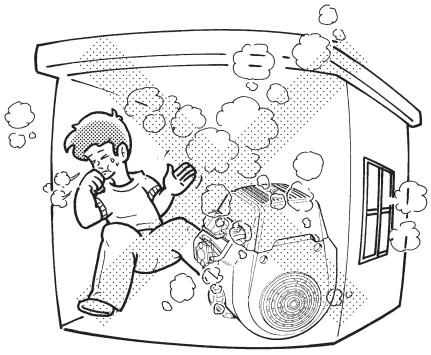
SÍMBOLOS

	Lea el manual.		*Cierre la válvula del combustible cuando no utilice el motor.*
	No toque las zonas calientes.		*Compruebe si hay fugas en las mangueras y acopladores.*
	Los gases de escape son venenosos. *No lo tenga en funcionamiento en una sala sin ventilación ni en un lugar cerrado.*		*Prohibido fumar y prender fuego.*
	Pare el motor antes de repostar.		*QUEMA, no toque las partes calientes.*

	ON (en marcha)		*Puesta en marcha del motor (arranque eléctrico)*		*Combustible (Gasolina)*
	OFF (detenido)		*Parada del motor*		*Combustible (diesel)*
	Aceite del motor		*Motor frío*		*Cierre del paso de combustible.*
	Añadir aceite		*Motor caliente*		*Falla/ malfuncionamiento del sistema de combustible*
	Batería		*Precalentamiento eléctrico (Ayuda al arranque a baja temperatura)*		*Estrangulador*
	Rápida		*Posición de marcha*		*Más; polaridad positiva*
	Lenta		*Posición de paro*		*Menos; polaridad negativa*
	Cebador		*Empujar el cebador*		*No empujar el cebador*
2X	*Dos veces*				

1. MEDIDAS DE SEGURIDAD

Por favor siga cada una de las si-guientes indicaciones :



CON LOS GASES DE ESCAPE

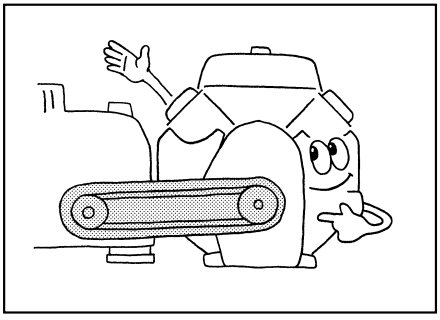
- No inhale nunca los gases de escape. Éstos contienen monóxido de carbono, un gas incoloro, inodoro y extremadamente peligroso, que puede causar la pérdida de conocimiento e incluso la muerte.
- No utilice nunca el motor en lugares cerrados o mal ventilados: túneles, cuevas, etc.
- Tenga mucho cuidado cuando utilice el motor cerca de personas y animales.
- Mantenga el tubo de escape libre de objetos extraños.

AL REPOSTAR COMBUSTIBLE

- Asegúrese de apagar el motor antes de repostar.
- No llene demasiado el depósito de combustible.
- En caso de salpicaduras de combustible, límpielo cuidadosamente y espere a que se seque antes de poner en funcionamiento el motor.
- Después de repostar, asegúrese de que la tapa del depósito esté bien cerrada para evitar salpicaduras.

PREVENCION CONTRA INCENDIOS

- No utilice el motor cuando fume ni cerca de llamas.
- No utilice el motor cerca de cepillos, ramas, trapos ni otros materiales inflamables.
- Mantenga el motor al menos a 1 metro de edificios u otras estructuras.
- Mantenga el motor alejado de materiales inflamables y peligrosos (basura, alfombras, lubricantes, explosivos).



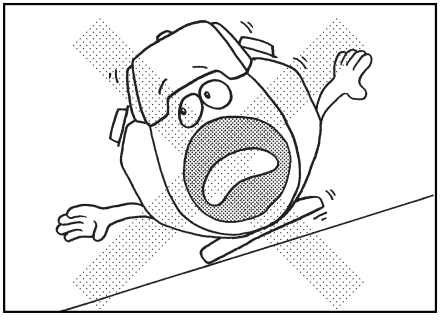
CUBIERTA PROTECTORA

■ **Coloque las cubiertas protectoras sobre las piezas giratorias.**
Si las partes giratorias (eje, polea, correa, etc.) están al descubierto, suponen un peligro potencial.
Para evitar riesgos personales, equípelas con cubiertas protectoras.

■ **Tenga cuidado con las piezas calientes.**
El silenciador y otras partes del motor están calientes cuando el motor está en marcha o inmediatamente después de haberlo apagado.
Utilice el motor en un área segura y lejos de niños.

■ Nunca ajuste la maquinaria mientras esté conectada al motor, sin haber quitado antes el cable de encendido de la bujía. Girar el cigüeñal manualmente durante el ajuste puede encender el motor y la maquinaria conectada al mismo, provocando serios daños al usuario.

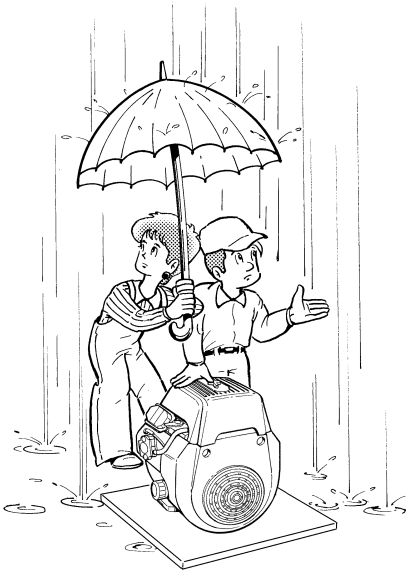
■ Nunca encienda el motor con el regulador conectado ni sobrepase la carga de 3600 r.p.m.



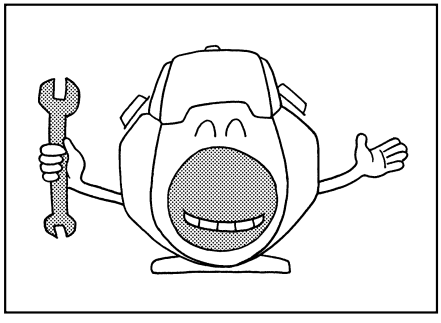
SURROUNDINGS ALREDEDORES

■ Utilice el motor sobre una superficie nivelada y estable, exenta de piedras, grava, etc.

NOTA
Utilizar el motor en una superficie inclinada puede causar daños por falta de lubricación, aunque el depósito de aceite esté lleno.



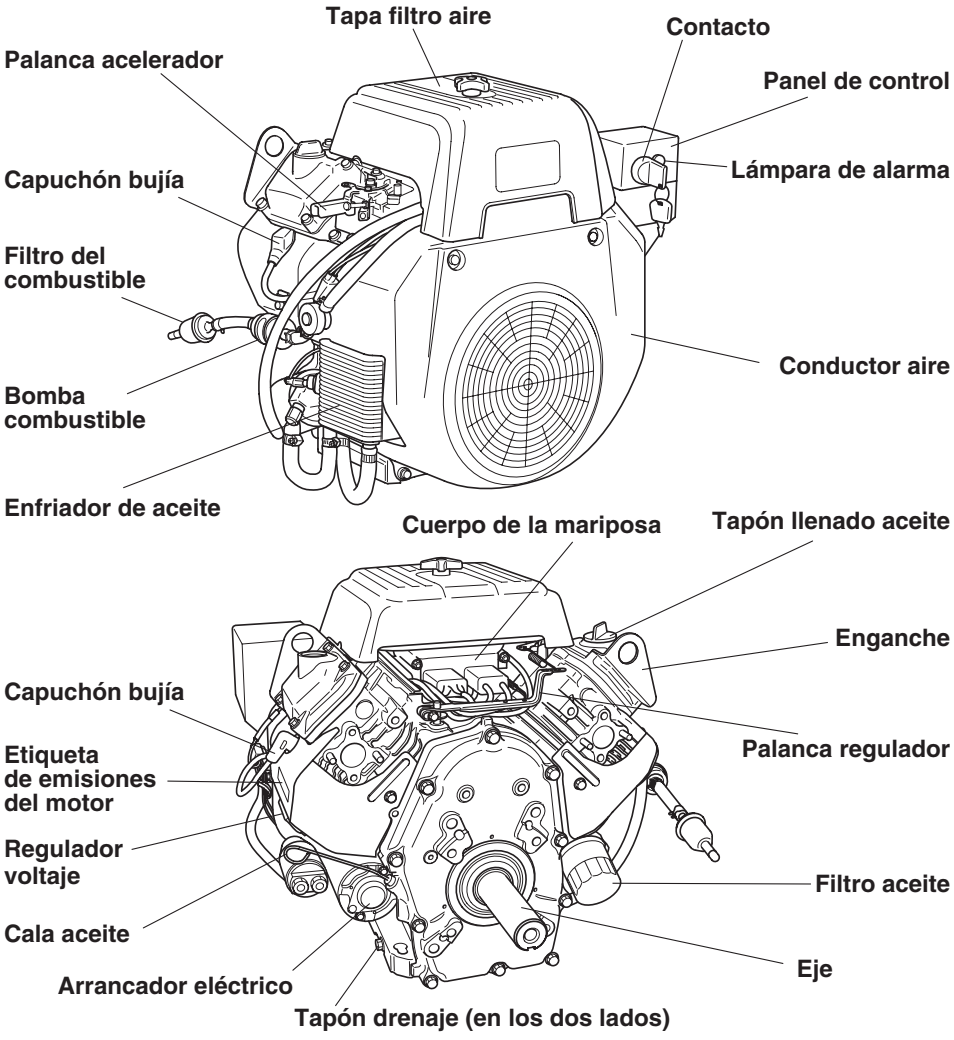
- **Vacíe el depósito de combustible antes de transportar el motor.**
- **No mueva el motor si está encendido cuando haya sido sacado del equipo.**
- Mantenga la unidad seca. (No opere el motor bajo la lluvia).



COMPROBACIONES PREVIAS AL FUNCIONAMIENTO

- Compruebe cuidadosamente que los tubos y juntas no estén flojos y que no haya fugas de combustible.
  El combustible derramado crea situaciones potenciales de peligro.
- Compruebe que no haya tuercas ni tornillos flojos. Un tornillo suelto puede causar serios daños al motor.
- Compruebe el nivel de aceite todos los días y rellene si fuese necesario.
- Compruebe el nivel de combustible y rellene si fuese necesario.
  Tenga cuidado de no llenar de más el depósito.
- Utilice ropa ajustada al utilizar el motor. Las chaquetas abiertas, toallas, cinturones, etc., pueden se enganchadas por el motor y crear una situación de peligro.

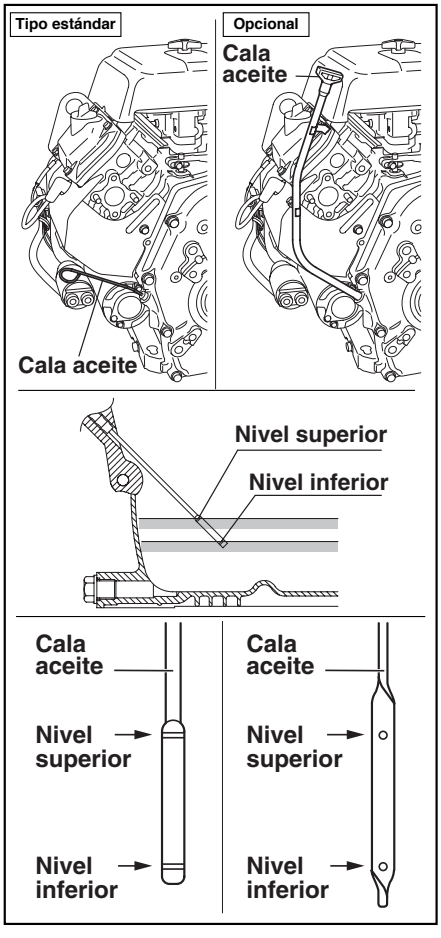
2. COMPONENTES



OBSERVACIONES :

- Para conectar la fuente de combustible al cuerpo de la mariposa se requieren el depósito de combustible, la válvula (se recomienda el tipo de taza de sedimentos), las mangueras de combustible, y el filtro de combustible.
- Para la operación de encendido del motor hace falta una batería de 12V-36AH o más, con su cable específico. Haga las conexiones de cableado necesarias antes del funcionamiento normal del motor. Vea la sección 4 de este manual de instrucciones.
  (Para ver las instrucciones, consulte la Sección 4 Instalación de la batería.)

3. CONTROLES PREVIOS AL FUNCIONAMIENTO



NIVEL DE ACEITE (DIARIO)

Antes de rellenar o comprobar el nivel de aceite, asegúrese de que el motor esté apagado y sobre una superficie nivelada.

■ Si el nivel de aceite está por debajo de la línea inferior de la cala, rellene con el aceite apropiado (ver tabla) hasta el nivel superior.
CAPACIDAD DE ACEITE : 1,55 LITROS

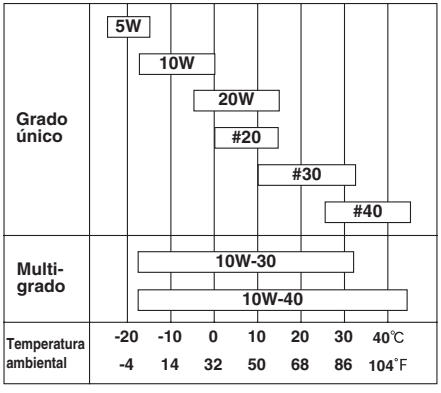
■ Cuando llene el depósito de aceite, mantenga el motor nivelado y llene hasta la marca superior de la cala de aceite. Mida el nivel de aceite con la cala acoplada en su sitio.

■ Después de un cambio de aceite, encienda el motor y compruebe su nivel. Éste puede bajar un poco al llenarse el filtro. Llénelo hasta la marca superior de la cala.

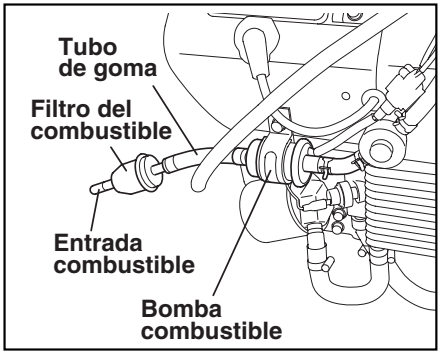
■ Cambie el aceite cualdo esté sucio (vea la Sección 8 para el plan de mantenimiento).

■ Utilice aceites detergentes para motor de 4 tiempos o de la categoría API SE o superior (SG, SH o SJ recomendados).

■ Si utiliza un aceite multigrado, el consumo de aceite tiende a aumentar cuando la temperatura ambiente es alta.



CONTROL DEL COMBUSTIBLE



⚠ ¡CUIDADO!

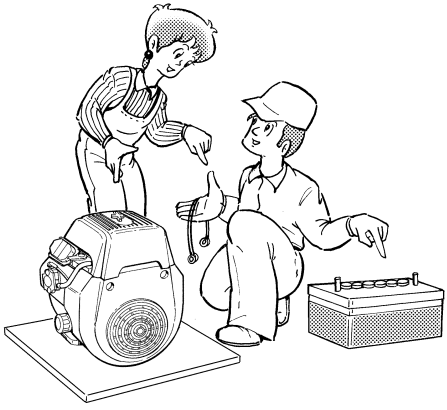
No reposte mientras fume ni cerca de llamas u otros peligros potenciales.

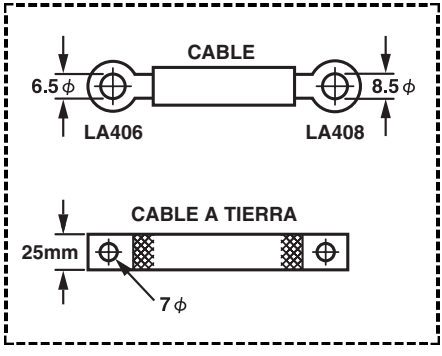
NOTA :
ESTE MOTOR ESTÁ CERTIFICADO PARA FUNCIONAR CON GASOLINA SIN PLOMO PARA AUTOMÓVILES.

- Se puede proporcionar el tanque de combustible por separado ya que el motor no está equipado con dicho depósito.
  La válvula de combustible y el filtro deberán conectarse entre el depósito y la bomba.
  Asegure las gomas a la bomba, para prevenir fugas de combustible.
- El depósito de combustible puede montarse hasta a 0,66 metros por debajo del cuerpo de la mariposa.
  Si se monta el depósito por encima del cuerpo de la mariposa, deberá instalarse entre el depósito y la bomba una válvula que corte el fluido de gasolina. Esta válvula deberá cerrarse cuando el motor esté apagado para evitar que el combustible rebose y encharque el cuerpo de la mariposa.
- Si la goma de combustible se sale de su sitio se puede producir un grave accidente. Asegure las conexiones de la línea de combustible introduciendo ls gomas en su sitio hasta el fondo y asegurándolas con una grapa.
- Emplee sólo gasolina sin plomo para automóviles.
- Apague el motor y cierre la válvula del combustible antes de repostar.
- Limpie bien el combustible derramado antes de encender el motor.

4. INSTALACIÓN DE LA BATERÍA

Para el encendido del motor, es necesario realizar una instalación de cables antes del funcionamiento normal del motor.





PIEZAS NECESARIAS

- Utilice una batería de 12V-36AH o más.
- Emplee un cable adecuado y un cable de toma de tierra para conectar la batería, el interruptor de la llave y el motor de arranque eléctrico.

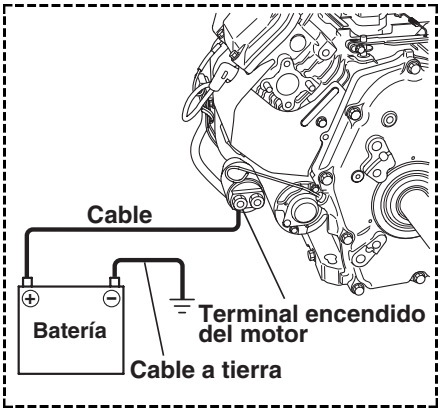
CABLES DE LA BATERÍA

LONGITUD CABLE	DIAM. CABLE	CALA CABLE		
		AWG (BS) BWG	SAE	JIS
menos de 1,5 m	7,3 mm	1	6	AV15
1,5 m a 2,5 m	8,5 mm	0	4	AV20
2,5 m a 4,0 m	10,8 mm	3/0	2	AV30

TOMA A TIERRA : utilice un cable plano con terminales de sección de 0,03 pulgadas cuadradas o más.
(CALA SAE 4)

CABLE DEL INTERRUPTOR DE LA LLAVE

LONGITUD CABLE	DIAM. CABLE	CALA CABLE		
		AWG (BS) BWG	SAE	JIS
menos de 1,5 m	1,5 mm	14	16	AV1,25
1,5 m a 3,0 m	1,9 mm	12	14	AV2
3,0 m a 5,0 m	2,4 mm	10	13	AV3



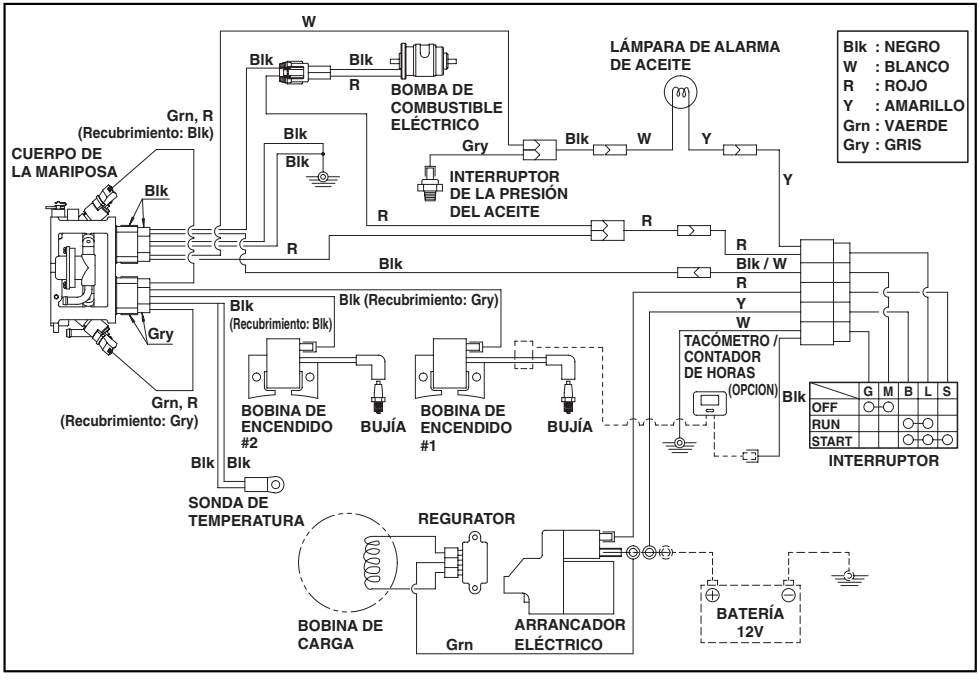
CABLEADO

- **Conecte el terminal positivo del automático al terminal positivo de la batería, con cable de batería.**
- **Conecte el terminal negativo de la batería al cuerpo del motor o de la máquina con cable a tierra.**

NOTA

Apriete los tornillos y tuercas de los terminales para que no se suelten con las vibraciones.

DIAGRAMA DE CABLEADO



Equipamiento opcional en líneas discontínuas. Seleccione cables de cala apropiada y conecte la batería según se muestra en la línea discontínua del diagrama de cableado.

ESPAÑOL

5. FUNCIONAMIENTO DEL MOTOR

NOTA

Para la palanca de control del tipo estándar, se emplea el siguiente método de operación.
En cuanto a la palanca de control de la velocidad del tipo fijo (véanse las especificaciones del generador), no la mueva, porque de lo contrario podría dañar componentes del generador tales como el regulador de tensión.

ARRANQUE

VÁLVULA COMBUSTIBLE

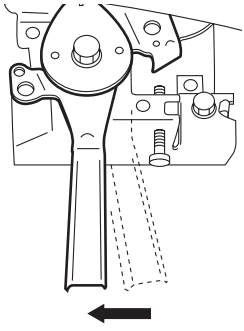
1

(Proporcionada por el fabricante)

Abra la válvula de combustible.

PALANCA ACELERADOR

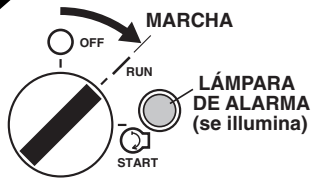
2



Sitúe la palanca del acelerador a 1/3 de distancia hacia la posición de máxima velocidad.

TIRADOR AIRE

3

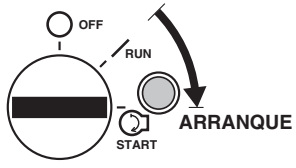


Si una caja de mando está instalada, girar el interruptor y ajustarlo a la posición “MARCHA” (RUN). Comprobar que se ilumina la lámpara de alarma y otras lámparas (de rojo).

- Al ajustar el interruptor a la posición de marcha (RUN), un ruido de funcionamiento de la bomba de combustible puede producirse por dos o tres segundos (esto no representa un defecto de funcionamiento).

ARRANCADOR ELÉCTRICO

4

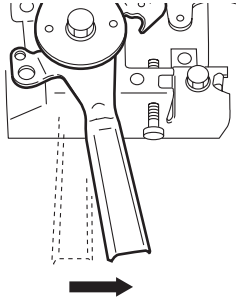


Gire el interruptor a la posición "ARRANQUE".

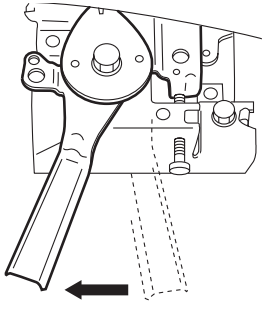
- No active el arranque eléctrico durante más de 5 segundos, aunque el motor no encienda.
- Si el motor no arranca, sitúe el interruptor en la posición "RUN" y espere 10 segundos antes de intentar de nuevo el arranque.
- Nunca sitúe el interruptor a la posición “ARRANQUE” con el motor encendido.

FUNCIONAMIENTO

PALANCA ACELERADOR



Una vez encendido el motor, sitúe la palanca del acelerador en la posición de baja velocidad y deje que se caliente el motor sin carga durante unos minutos.



Mueva gradualmente la palanca hacia la posición de alta velocidad y sitúela en la velocidad requerida.

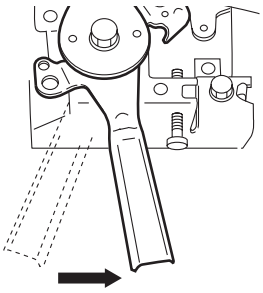
NOTA :

Cuando no necesite velocidad alta, redúzcala hasta ralentí para reducir el consumo de combustible y alargar la vida del motor.

PARADA

PALANCA ACELERADOR

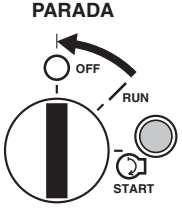
1



Sitúe la palanca del acelerador en la posición de baja velocidad y deje que el motor funcione durante 2 ó 3 minutos sin carga.

ARRANCADOR ELÉCTRICO

2



Gire el interruptor a la posición "PARADA".

VÁLVULA COMBUSTIBLE

3

Cierre la válvula de combustible.

ESPAÑOL

6. LOCALIZACIÓN Y REPARACIÓN FÁCIL DE AVERÍAS

CUANDO EL MOTOR NO ARRANCA

- Realice las siguientes comprobaciones antes de llevar el motor a su distribuidor ROBIN.
- Si después de comprobar estos puntos sigue teniendo problemas, lleve el motor a su distribuidor ROBIN.

¿Hay suficiente compresión?

Si la bujía esta floja, apriétela.

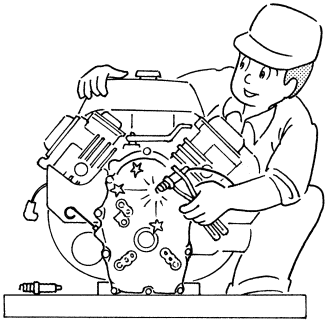
¿Está la bujía humedecida con gasolina?

1. Lentamente encienda el motor duante 2 ó 3 segundos.
   Extraiga la bujía y compruebe si el electrodo está húmedo. Si es así, hay un buen suministro de combustible al motor.
2. Si el electrodo está seco, mire dónde se corta el suministro de combustible. (Revise la admisión de combustible del cuerpo de la mariposa y la entrada en la llave de paso).
3. Si el motor no arranca con una circulación correcta de combustible, inténtelo utilizando gasolina nueva.

⚠ ¡CUIDADO!

Limpie bien el combustible derramado antes de comprobar la bujía.

Sitúe la bujía lo más lejos posible de su hueco.
No sujete la bujía con la mano mientras la prueba.

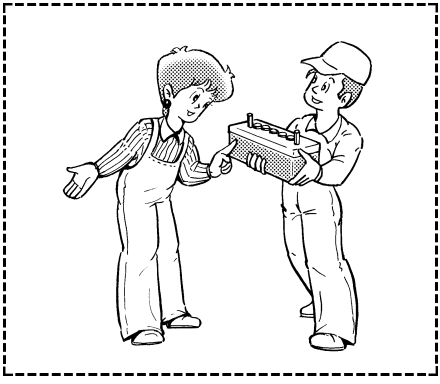


¿Hay suficiente chispa en el electrodo?

1. Extraiga la bujía y conéctela al capuchón.
   Gire la llave a la posición "ARRANQUE" haciendo masa con la bujía contra el cuerpo del motor.
2. Cambie la bujía si no hay chispa o si ésta es demasiado débil.
3. El sistema de encendido está dañado si no hay chispa con una bujía nueva. Lleve el motor a su distribuidor ROBIN más próximo.

Acerca de la lámpara de alarma

- Comprobar el aceite para ver si la lámpara de alarma se ilumina durante la conducción del vehículo. (Véase la Sección "**3. CONTROLES PREVIOS AL FUNCIONAMIENTO**" para las instrucciones.
- Hacer examinar el vehículo por el taller del concesionario o un servicio de manutención si la lámpara de alarma parpadea durante la conducción del vehículo.



¿Está cargada la batería?

Revise la batería. Puede estar descargada y no podrá activar el arranque eléctrico. Consúltelo con su proveedor más cercano.

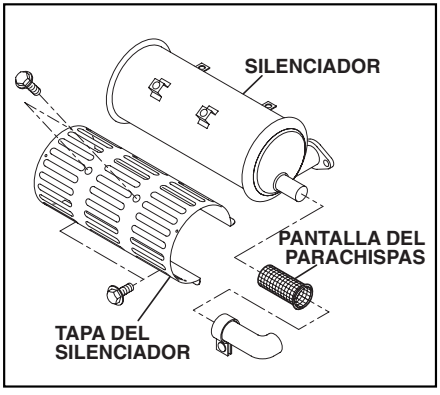
7. PARACHISPAS (OPCIONAL)

En zonas secas o boscosas es recomendable utilizar el producto con un parachispas. Algunas zonas exigen el uso de parachispas. Infórmese sobre las normas y leyes locales antes de utilizar el producto.

Es necesario limpiar el parachispas regularmente para garantizar su funcionamiento correcto. Un parachispas atascado :

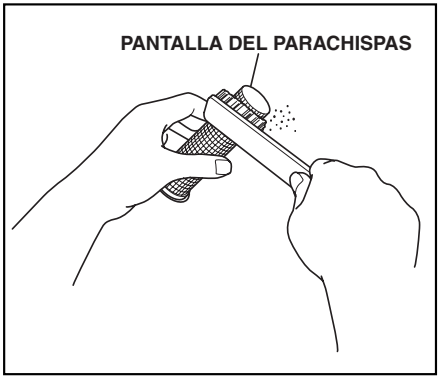
- Impide el flujo del gas de escape
- Reduce el rendimiento del motor
- Aumenta el consumo de combustible
- Dificulta el arranque

Si el motor ha estado funcionando, el silenciador y el parachispas estarán muy calientes. Espere que el silenciador se enfríe antes de limpiar el parachispas.



Cómo quitar el parachispas

1. Quite los pernos de la tapa del silenciador y quite la tapa del silenciador.
2. Quite el tornillo especial del parachispas y quite el parachispas del silenciador.



Cómo limpiar la pantalla del parachispas

Con un cepillo quite los depósitos de carbón de la pantalla del parachispas. Tenga cuidado de no dañar la pantalla.

El parachispas no debe presentar roturas ni agujeros. Sustituya el parachispas si está dañado.

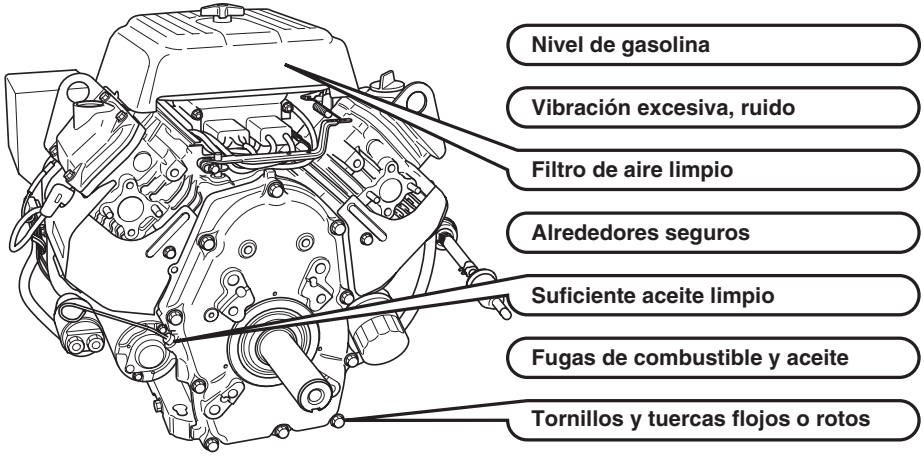
Instale el parachispas y la tapa del silenciador en el orden inverso al desensamblaje.

8. PLAN DE MANTENIMIENTO

EL MANTENIMIENTO, LA SUSTITUCIÓN Y LA REPARACIÓN DE LOS SISTEMAS Y DISPOSITIVOS DE CONTROL DE EMISIONES DEBEN SER REALIZADOS POR UN INDIVIDUO O UN ESTABLECIMIENTO REPARADOR DE MOTORES NONROAD.

INSPECCIÓN DIARIA

Antes de encender el motor, compruebe los puntos siguientes.



INSPECCIÓN PERIÓDICA

Realizar un mantenimiento periódico es imprescindible para lograr un funcionamiento seguro y eficaz del motor.
Para los intervalos de mantenimiento periódico, consulte la siguiente tabla.

ES NECESARIO QUE EL USUARIO DE ESTE MOTOR REALICE EL MANTENIMIENTO Y LOS AJUSTES DE LAS PIEZAS RELACIONADAS CON LA EMISIÓN, LISTADAS A CONTINUACIÓN, PARA MANTENER LA EFICIENCIA DEL SISTEMA DE CONTROL DE EMISIONES.

El sistema de control de emisiones está compuesto por las siguientes piezas:

(1) cuerpo de la mariposa y piezas internas
(2) Circuito enriquecedor para arranque en frío, si corresponde
(3) Colector de admisión, si corresponde
(4) Elementos del filtro de aire
(5) Bujía
(6) Sistema de ignición magnético o electrónico
(7) Sistema adelanto/atraso de chispa, si corresponde
(8) Colector de escape, si corresponde
(9) Manguitos, cintas, conectores y ensamblajes

El programa de mantenimiento indicado en la siguiente tabla está referido al uso normal del motor. Si el motor se utiliza en ambientes muy polvorientos o con cargas pesadas, los intervalos de mantenimiento deben abreviarse en función de la contaminación del aceite, el atascamiento de los elementos filtrantes, el desgaste de las piezas, etc.

Tabla de mantenimiento periódico

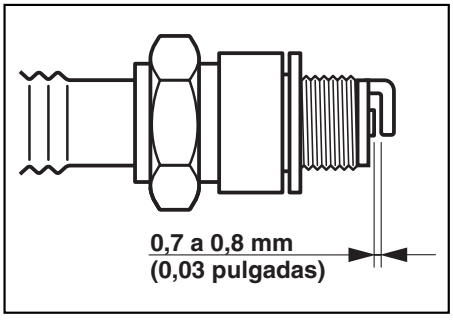
Elementos de mantenimiento	Cada 8 horas (Diariamente)	Cada 50 horas	Cada 200 horas	Cada 500 horas	Cada 1000 horas
Limpieza de motor y estado de tuercas y tornillos	● (Diario)				
Controle y restablezca el aceite del motor	● (A diario, hasta el nivel superior)				
Cambio de aceite (*Nota 1)	● (Inicial, 20 horas)	● (Cada 100 horas)			
Limpieza del filtro de aceite (*Nota 1)	● (Inicial, 20 horas)		●		
Nivel de líquido en la batería		●			
Limpieza de bujía		●			
Limpieza del filtro de aire		●			
Parachispas (opcional)		● (Cada 100 horas)			
Cambio del elemento del filtro			●		
Limpie el filtro del combustible.			●		
Limpieza y ajuste de los electrodos de la bujía			●		
Sustituya la bujía				●	
Quite el carbón de la cabeza del cilindro				●	
Limpie el cuerpo de la mariposa (*Nota 2)				●	
Limpieza de la base del motor (bandeja de aceite)				●	
Ajuste distancias de válvulas				●	
Sustituya las líneas de combustible					● (Anual)
Revise el motor (*Nota 2)					●

*Nota 1 : El primer cambio de aceite y la primera sustitución del filtro de aceite deberían realizarse a las 20 horas de funcionamiento.
En lo sucesivo cambie el aceite cada 100 horas y sustituya el filtro cada 200 horas. Antes de cambiar el aceite encuentre una forma adecuada de eliminar el aceite usado. No lo deseche en el sumidero de aguas negras, en el jardín o en cursos de agua abiertos. Las normas locales de zonificación o medio ambiente le proporcionarán instrucciones más detalladas sobre la eliminación correcta.

*Nota 2 : En cuanto a los procedimientos, remítase al Manual de Servicio o consulte a su centro de asistencia ROBIN más cercano.

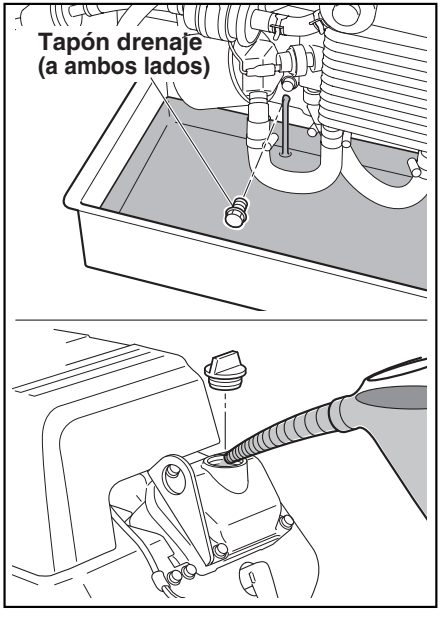
*Nota 3 : Según las condiciones de uso, puede ser necesario realizar con mayor frecuencia el cambio de aceite, la sustitución del filtro de aceite y la revisión del filtro de aire, especialmente si el ambiente es polvoriento, si la temperatura ambiente es alta o si la carga del motor es muy pesada.

9. COMPROBACIONES Y MANTENIMIENTO FÁCILES



INSPECCIÓN DE LA BUJÍA

- Limpie el electrodo de la bujía de depósitos de carbonilla utilizando un limpiador de bujías o un cepillo de alambre.
- Compruebe el espacio entre los electrodos.
  Ajuste el espacio de :
  0,7 a 0,8 mm (0,03 pulgadas)
- Tipo de bujía recomendado :
  BPR5ES (NGK) o BPR4EY (NGK)

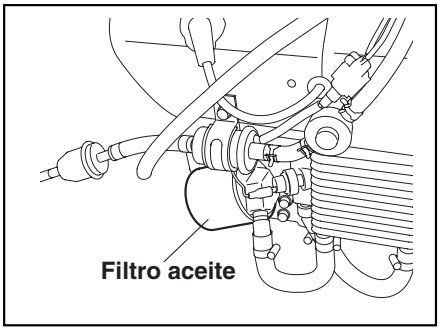


CAMBIO DE ACEITE DEL MOTOR

- Cambio inicial . . . . . .a las 20 horas.
- Siguientes cambios . .cada 100 horas.

1. Al cambiar el aceite, pare el motor y saque el tapón de drenaje.
2. Vuelva a colocar el tapón de drenaje antes de rellenar el aceite.
3. Consulte la tabla del aceite recomendado.
   (Vea la Sección 3 Controles previos al funcionamiento)
4. Utilice siempre aceite limpio del grado recomendado. Aceite sucio, de mala calidad o escaso puede dañar el motor, acortando su vida.

CAPACIDAD DE ACEITE : 1,55 LITROS.

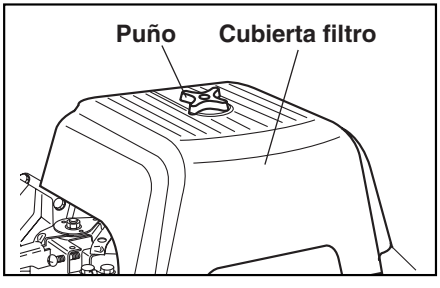


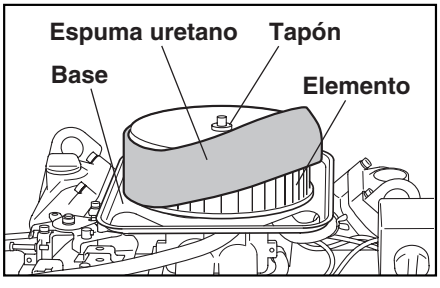
CAMBIO DEL FILTRO DE ACEITE

- Cambio inicial: a las 20 horas.
- Siguientes cambios: cada 200 horas.
- Al instalar un nuevo filtro, ponga aceite en la arandela, coloque el filtro en su sitio y apriételo 2/3 de vuelta, a mano o con una llave, una vez que la arandela toque la superficie de sella-do del motor.
- Haga funcionar el motor durante un minuto; apague el motor y verifique que no hay fugas de aceite alrededor del filtro. Revise el nivel de aceite.

⚠ ¡CUIDADO!

Para evitar lesiones, tenga cuidado con derrames de aceite caliente al cambiar el filtro





LIMPIEZA DEL FILTRO DE AIRE

Un filtro de aire sucio causará problemas de arranque, pérdida de potencia, funcionamiento irregular y reducción de la vida del motor.

Asegúrese de limpiar periódicamente el filtro. Cambie los elementos con más frecuencia si se opera en un entorno excesivamente polvoriento.

Los elementos de papel y de espuma de uretano pueden extraerse tras sacar el puño y la cubierta del filtro de aire. Al instalarlos, sitúe el elemento de papel y el de espuma en la base del filtro. Asegúrese de que el tapón esté en su sitio y después coloque la cubierta con el puño asegurado en su sitio.

- Limpieza de la espuma de uretano

  Lavar la espuma en keroseno. Empapar en una mezcla de 3 partes de keroseno y 1 de aceite del motor, oprimiendo para eliminar el exceso de líquido. Limpie o cambie la espuma cada 50 horas (menos en ambientes polvorientos).

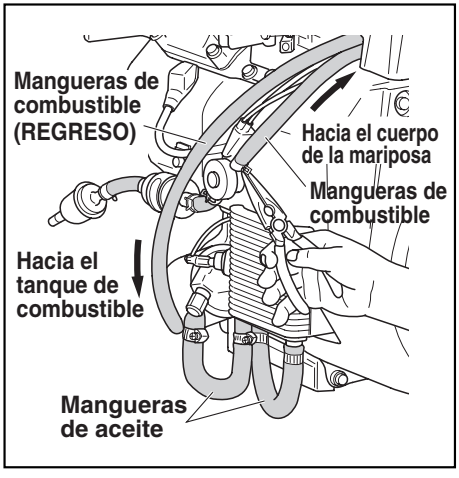
■ Limpieza del elemento de papel

Limpie golpeando suavemente y soplándole el polvo. Nunca utilice aceite. Limpie o cambie el elemento cada 50 horas y cámbielo cada 200 o una vez al año.

Limpie y cambie el filtro de aire con más frecuencia si trabaja en ambientes polvorientos.

REVISIÓN DE TUERCAS Y TORNILLOS

Apriete tornillos y tuercas flojos. Revise posibles fugas de aceite y combustible. Cambie las piezas dañadas por nuevas. Tenga siempre presente la seguridad.


Mangueras de combustible (REGRESO)
Hacia el cuerpo de la mariposa
Mangueras de combustible
Hacia el tanque de combustible
Mangueras de aceite

CAMBIO DE GOMA DE COMBUSTIBLE

⚠ ¡CUIDADO!

Extreme el cuidado al cambiar la goma. La gasolina es inflamable.

Reemplace las mangueras de combustible y de aceite cada 1.000 horas o cada año.
Si aparece una fuga, cambie la goma inmediatamente.

REVISIÓN DE LA BATERÍA

⚠ ¡CUIDADO!

El líquido de la batería es un ácido venenoso y corrosivo.
Se pueden producir serios daños si hay contacto con la piel, ojos y ropa.

Si el nivel del líquido de la batería es bajo, rellénela con agua destilada.

FUNCIONAMIENTO DEL MOTOR A ALTA ALTITUD

Este motor está dotado con el sistema FI.

La razón aire/carburante durante la conducción a alta altitud está corregida automáticamente por este sistema FI.

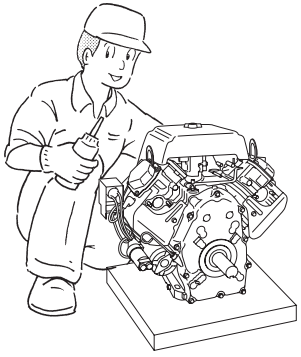
La corrección automática es posible hasta 3000 metros (9800 pies).

10. PREPARATIVOS PARA EL ALMACENAMIENTO

UTILICE TODO EL COMBUSTIBLE HASTA SU AGOTAMIENTO

⚠CUIDADO **Prohibido fumar**

Si no se utiliza el motor para más de un mes, operar el motor hasta que el combustible esté agotado completamente, luego almacenar el equipo en un lugar que presenta baja humedad con el fin de evitar todos los problemas de arranque y funcionamiento debido al deterioro del combustible.



ACEITE DEL MOTOR

- Cambie el aceite por uno nuevo.
- Quite la bujía, ponga 5cc. de aceite de motor en cada cilindro, encienda el motor lentamente durante 2 ó 3 segundos y vuelva a instalar la bujía.

LIMPIEZA Y ALMACENAMIENTO

- Quite los cables de la bujía.
- Gire lentamente el cigüeñal hasta que ofrezca resistencia y déjelo en esa posición.
- Limpie el motor con un trapo mojado en aceite y almacénelo bajo cubierta en una zona bien ventilada y seca.

11. ESPECIFICACIONES TÉCNICAS

MODELO	EH72 FI
Tipo	Enfriamiento de aire, 4 tiempos, cilindro doble en V, árbol de toma de fuerza horizontal (P.T.O.), motor de gasolina OHV
Diámetro x carrera mm(pul.)	2-84 x 65 (3,31 x 2,56)
Desplazamiento cm^3(Cúbico-pul.)	720 (43,9)
Potencia contínua kW (HP) / rpm	14,9 (20,0) / 3600
Potencia máxima kW (HP) / rpm	20,9 (28,0) / 4000
Par de torsión máximo N·m (kgf·m) / rpm	52,2 (5,32) / 2800
Sentido de la rotación	Contrario al sentido de las agujas del reloj
Lubricante	Aceite para automóvil tipo SAE #20, #30 ó 10W-30 ; clase SE, SF o superior (SG, SH o SJ recomendados)
Capacidad del lubricante litros (U.S. gal)	1,55 (0,41)
Combustible	Gasolina sin plomo para automóvil
Bujía	BPR5ES (NGK) o BPR4EY (NGK)
Sistema de arranque	Eléctrico
Peso en seco kg (libras)	46 (101,3)
Dimensiones (L x An x Al) mm (pul.)	317 x 477 x 480 (12,5 x 18,8 x 18,9)
Juego de la válvula (admisión y escape)	0,1 ± 0,02 mm (0,0039 ± 0,0008 pul.) Nota: Ajuste el juego de la válvula mientras el motor esté frío.
Período de duración de las emisiones (sólo California)	250 horas

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SUBARU

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